NAVAL FIGHTERS NUMBER TWENTY

# Grumman AF GUARDIAN

## INTRODUCTION

This book was created from the writings of Bob Kowalski, who flew the AF with VS-30 during 1953-54. His manuscript was published in abbreviated form in The Hook (journal of the Tailhook Association) fall 1985 and summer 1986. Additional information and photos were provided by Lawrence Webster. All photos without credits were provided by Grumman.

Anyone having photos or other information on this or any other naval or marine aircraft, may submit them for possible inclusion in future issues. Any material submitted will become the property of NAVAL FIGHTERS unless prior arrangement is made. Individuals are responsible for security clearance of any material before submission. **ISBN 0-942612-20-5**
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## PRODUCTION

A total of 389 Guardians were built by Grumman between December 1946 and May 1953.
One XTB3F-1, one XTB3F-1S, one XTB3F-2S, 193 AF-2S, 153 AF-2W, and 40 AF-3S.
XTB3F-1 (XTB3F) BuNo 90504.
XTB3F-2S (XTB3F-2, XTB3F-1) BuNo 90505.
XTB3F-1S (XTB3F-2, XTB3F-1) BuNo 90506.
AF-2S BuNos 123089/123116 even numbers only, 124188/124208 even numbers only, 124778/124848 even numbers only, 126720/126737 consecutively, 126756/126821 consecutively, and 129196/129242 consecutively.
AF-2W BuNos 123089/123117 odd numbers only, 124187/124209 odd numbers only, 124779/124849 odd numbers only, 126738/126755 consecutively, 126822/126835 consecutively, 129258/129299 consecutively, 130389/130404 consecutively.
AF-3S BuNos 129243/129257 and 130364/130388.

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## MARKING NOTES

Although the AF was operational in the period when all Navy aircraft were painted glossy sea blue overall, there was room for variation between the individual squadrons. There was, however, a marking that was common to all fleet AFs and that was the use of white main landing gear struts and finette bottoms. This was done to increase their visibility, especially during night carrier operations where the finettes, in particular, had the capability of injuring unwary flight deck personnel. Although the Atlantic Fleet squadrons all conformed to a standard pattern for their finette bottoms, the Pacific Fleet squadrons showed their individuality by using patterns that were unique to each squadron. Some squadron prop domes were also marked in different colors and patterns. The following are the squadrons, their identification letters and individual marking notes:

| | |
|---|---|
| VS-931/-20 | SV |
| VS-21 | BS |
| VS-22 | SL Yellow prop domes |
| VS-24 | SI |
| VS-25 | SK White prop domes |
| VS-27 | SM |
| VS-801/-30 | SW White prop domes with a red dot |
| VS-31 | SP White prop domes with red stripes |
| VS-831/-36 | SD |
| VS-871/-37 | SU Rooster tail marking |
| VS-913/-39 | SN Yellow prop domes and finette bottoms |

**FRONT COVER: VS-931 AF-2W prepares to launch from the USS Badoeng Strait (CVE-116) during WestPac operations in 1952. (Ted Heineman via Tailhook photo service)**

# THE GRUMMAN AF GUARDIAN, HUNTER-KILLER ASW AIRCRAFT

**Early test flight of XTB3F-1 90504 with the wing leading edge jet intakes as originally installed. Aircraft was overall natural metal with a red rudder and world war two style national insignia. (National Archives)**

## TEXT BY ROBERT J. KOWALSKI

In 1953, the mainstay of carrier-based anti-submarine warfare (ASW) forces in the Navy were represented by a pair of Grumman AF-2W and AF-2S Guardians flying as a hunter-killer team and operating from an escort carrier of the Commencement Bay (CVE-105) class. The Guardian's wingspan of 60 feet, length of 43 feet 5 inches and height of 16 feet 7 inches, made it the largest single-engine piston-driven airplane ever to operate from an aircraft carrier. Begun as World War II's last torpedo bomber, the AF was extensively revised and revamped before it found its role in pioneering ASW airborne tactics. Once its ASW role was established, the actual operational career of the aircraft was very brief, being replaced in 1954 by the Grumman S2F Tracker after only four years of fleet service.

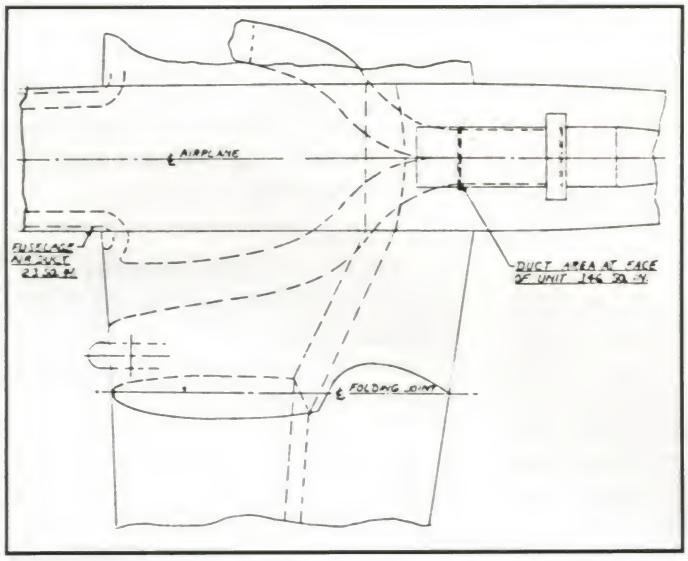
The Guardian evolved from a 1944 Navy requirement for a high-speed torpedo scout bomber (VTB) replacement for the Grumman TBM Avenger. The aircraft was to be armed with a pair of wing mounted 20mm cannons and powered by the combination of a reciprocating engine and a jet engine. Grumman's composite powered answer was the XTB3F-1 which was powered by a Pratt and Whitney R-2800-34W augmented by a Westinghouse 19XB-2B (J-30-WE-20) jet engine.

On 9 October 1944, Grumman's XTB3F-1 proposal was accepted by the Navy and three prototypes were ordered. The proposed aircraft would be 100 knots faster than the Avenger while carrying two torpedoes internally. As was standard practice for the the composite powered aircraft of the time, the inlets for the jet engine were located in the leading edge of the wing roots and the tailpipe exhausted from the aft end of the fuselage. Since the jet engine and the two internally mounted torpedoes occupied all the space within the fuselage not used for fuel, the station for the second crewmember (radar-bombardier) was located in the cockpit to the right and slightly aft of the pilot's seat.

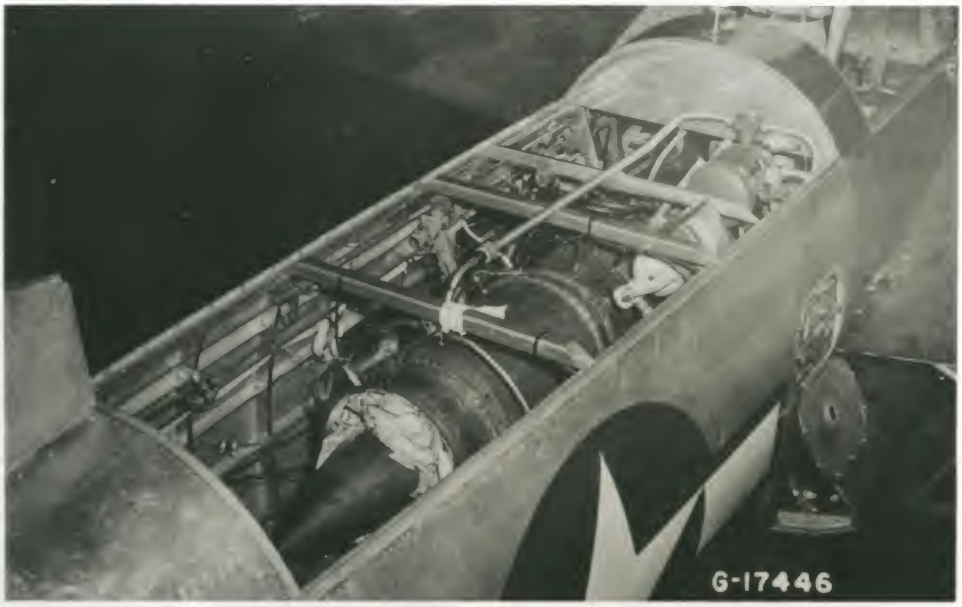
Of the three aircraft procured under the original contract, only the first one, BuNo 90504, was equipped with the composite powerplant installation. Delays with the delivery of the jet engines coupled with a low development priority assigned to the XTB3F-1, dictated by Grumman's development work on the new F9F Panther, caused the program to fall behind changing Navy requirements. In addition to the engine delays, initial ground testing of the engine (jet power unit or JPU) caused the titanium sheeted "Y" shaped air intake ducts to crack and collapse. Because of these facts the XTB3F-1 was never flown with the jet engine in operation.

By the time Grumman test pilot Pat Gallo flew the first flight in the prototype (BuNo 90504) on 19 December 1946, a major redesign to meet new Navy requirements was already under way. This new requirement was dictated by the change in Navy doctrine which had created the attack squadron (VA) to replace individual bombing (VB) and torpedo (VT) squadrons in the air groups. This eliminated the need for a high-speed torpedo bomber and a stop-work order was sent to Grumman on 24 December 1946. Since there was a need to replace aging TBMs in the ASW role, BuAer amended the order with a change notice to develop anti-submarine warfare aircraft out of the Guardians.

On 29 January 1947, a change request was issued that required the two remaining XTB3Fs to be used as




**XTB3F-1 90504 on 4-28-47 with wing-root jet air intakes and open bomb bay doors. Wing landing gear doors were deleted on subsequent airplanes. At left, drawing of the "Y" engine air intake ducts as installed on 90504. Below, installation of the jet in 90504. This was the only aircraft to have the jet engine installed, although it was never used in flight.**




prototypes for the production versions of an all-new ASW aircraft. This led to the 20 February 1947 designation of the second and third XTB3F-1 prototypes as XTB3F-1S and XTB3F-2S. The mission change called for a complete redesign of the original XTB3F-1 and was to involve long and intensive flight testing with the two prototypes.

For this ASW role there was no need for the added speed the jet engine would provide. With the deletion of the jet there was room available within the cavernous fuselage for added fuel, ASW equipment and operators. The Navy and Grumman agreed that to accomplish this total change in mission would require two separate aircraft to carry the proposed load. One aircraft would carry the search gear including the APS-20 search radar in its bulbous underbelly radome, and the other would carry the

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**PHOTOS AT RIGHT: Top, 90504 on 4-27-47 with test modification of large dorsal fin and with faired over jet tailpipe in the tail. Upper middle, 90504 in June 1947 with wing-root air intakes and landing gear doors removed. (H. G. Martin via Larkins) Lower middle, 90504 with smaller wing-root air intakes and the nickname "Fertile Myrtle" added to the fuselage. (H. G. Martin via L. Webster) Bottom, 90504 in flight with the wing-root air intakes completely closed off. (H. G. Martin via L. Webster)**

**90504 in late 1948 with wing tufting and strips added to the rudder to increase its effectiveness. A smaller national insignia has been painted on the fuselage and a blade antenna similar to that used on AM-1Qs has been added to the fuselage. (H. G. Martin via Larkins)**

ordnance. The two aircraft would work in concert as the "Hunter-Killer" team.

The original prototype (90504) was used as a utility test aircraft and latter as a source of spare parts for the other two prototypes. The name "Fertile Myrtle" was painted on the port side of the fuselage just aft of the engine cowling and the aircraft was eventually stricken on 31 March 1949.

The XTB3F-1S (BuNo 90506) was extensively modified to be the search version and first flew on 1 October 1948. At the time, this aircraft was still configured with a jet exhaust in the aft end of the fuselage. Shortly after its first flight the jet exhaust was faired over and radar counter measure (RCM) antennas were added to the lower aft fuselage. Modifications consisted of doing away with the front seat observer and adding two crew positions in the aft fuselage at station 276. The torpedo bay was deleted with a large radome and APS-20 radar installed in the space. It was also planned that the production models of the search, or hunter version, would carry sonobuoys and sonobuoy receivers. When the ASW operator complement was increased to three, by the addition of an RCM operator, the XTB3F-1S designation was changed to AF-1S in March 1948. With a change in the engine model, to the R-2800-48W, which would become the production standard, plus the elimination of the sonobuoy carrying capability, the AF-1S became the AF-1W in May 1949. Finally, on 6 July 1949, the designation was changed to AF-2W, the designation it retained throughout its service life.

The XTB3F-2S (BuNo 90505) was the attack version, with modifications to the -2S being basically the same as the -1S, except for the small wing mounted radar and searchlight, sonobuoy receiver and combination periscope / bombsight. The attack version was designed to carry six 5-inch HVAR rockets, four 500-lb bombs or four MK-54 depth bombs under the wings and an ASW homing torpedo in the unmodified torpedo bay. The attack version was originally designated AF-2S, but with the engine change the designation was changed to AF-1S only to be changed back to AF-2S on 6 July 1949. This was the definitive version of the attack model. When the

**Ground view of 90504 in late 1948. This aircraft was stricken from the inventory on 31 March 1949. (via Bob Kowalski)**

**The killer prototype, XTB3F-2S 90505 with Grumman's Vic Marks at right and Dave Wernstein at left. (via L. Webster)**

later attack versions were produced with MAD (Magnetic Anomaly Detection), they were designated AF-3S and became the final model of the killer version of the Guardian.

## FLIGHT TESTING

Service Acceptance and Production Trials were held at NAS Patuxent River, Maryland, on 2-3 February 1949 with both ASW prototypes taking part. The results of these first trials showed a need to reduce the control forces required on all three control surfaces and to improve the lateral control effectiveness. In addition it was recommended that brake effectiveness be improved and that the retractable tail-wheel needed improvement to increase it's effectiveness during cross-wind taxiing.

90505 was re-evaluated on 21 July 1949 with flaperons (spoiler ailerons) installed for evaluation of this lateral control system. Recommendations resulting from this trial showed the soundness of the flaperons and also included an increase in the rudder boost ratio. 90505 was then returned to Grumman and subsequently destroyed as the result of an accident on 4 October 1949. The accident was caused by a prop failure and the Hamilton Standard representative on board was killed in the crash.

Testing continued with 90506 participating in carrier suitability trials at NAS Patuxent River from 27 September to 16 December 1949. These landings showed problems with scraping the propeller during the arrestment rollout. To keep the tests going, the longer original propeller was replaced with a shorter 12 foot 2 inch Aero prop used on the F8F-2

**90505, the killer prototype in flight. (via Bob Kowalski)**



Hunter prototype 90506 with Grumman test pilot "Corky" Meyer at the controls. Aircraft is overall natural metal with a reddish brown eagle with white head and tail and a yellow beak painted on the nose and tail of the Guardian. At left, close-up of the eagle and the word GUARDIAN which was blue bordered by yellow. Hunter 90506 and Killer 90505 in flight together prior to Navy acceptance of the prototypes.

Three views of XTB3F-1S 90506 during prototype testing. Aircraft is still overall natural metal with red control surfaces. A yellow band is painted on the blade antenna on top of the fuselage and the exhaust pipe beneath the rudder has been eliminated.

**The photo above shows the immense size of the belly radome on 90506. At left, damage to propeller during arrestment tests. (USN via Bob Kowalski) Below, 90506 in flight on 12-15-49 with the shorter 12' 2" F8F Bearcat prop which was fitted in place of the damaged prop so that flight testing would not be delayed. NATC markings have been added as well as "FT" for Flight Test. (Natinal Archives)**

Bearcat. Carrier suitability tests proved satisfactory but identified problems of excessive bounce and excessive tail rise during run out. A new hook suspension design resolved the tail rise problem. The trials report also pointed out three additional problem areas, which included excessive lateral stick forces and severe rudder buffet in the PA (power approach) configuration and poor visibility from the cockpit during the carrier approach because of distortion from the windshield side panels. The third item was the recommendation to strengthen the retractable tail wheel. Following these

trials, 90506 was transferred to the Naval Air Material Center in Philadelphia, where it was eventually stricken in January 1951 after logging only 122 hours.

Concurrent with the testing of the XTB3Fs, work on the AF proceeded so that the first flight of the production model took place at Bethpage on 17 November 1949. The aircraft was an AF-2W (BuNo 123088) and, for the Grumman test pilot, "Corky" Meyers, the flight quickly changed from the routine when, as he attempted to retract the landing gear after take-off, the landing gear handle broke off in his hand. The gear was successfully extended by blowing the gear down. The shortened flight was concluded with a normal landing. Shortly thereafter, the first AF-2S (BuNo 124187) flew on 14 December.

**Early production AF-2W 123089 with the rounded fin and prior to the addition of the auxiliary finettes and with the original long exhaust stacks. (H. G. Martin via Larkins) Early AF-2S 123094 on 6-28-50 with short exhaust stacks. (National Archives)**

During production testing Grumman's pilots had another oppertunity to solve a landing gear problem, in the winter of 1952.The port landing gear of an AF-2S failed to lock down after being extended for landing. The pilot, former naval aviator Tom Attridge, made a low pass by the Bethpage tower for confirmation of the problem and then he proceeded clear of all populated areas, to circle while emergency plans were formulated. It was decided to have another aircraft try and nudge the partially extended landing gear into the locked position. Former marine Bill Cochran was launched in an AF-2W and, after joining up with Tom, did use his starboard wing tip to nudge the recalcitrant landing gear into the, "down and locked" position. Both aircraft then proceeded to make normal landings where inspection revealed that the only damage was the slightly dented starboard wing tip of Bill's AF-2W.

## THE AIRCRAFT

The production AF's flight system used fabric covered control surfaces and, except for the flaperons, was a conventional system. To help the pilot get the proper control surface deflection of the AF's large-sized control surface, a control boost system was required. For the ailerons and elevators, this boosting was aerodynamically accomplished by the use of spring control tabs on each control surface. These control tabs were cable-connected to the joystick and did provide the pilot with a good "sense of feel".

Prototype and early production Guardians were built with the esthecally pleasant "rounded" fin and rudder tips of the F8F Bearcat. The finalized production aircraft recalled the "squared-off" wing and rudder tips of the earlier F4F Wildcat and F6F Hellcat.

Slots were located in the leading edge of the wing, extending the span of each aileron to provide effective controls right up to a stall. At 24,000 pounds the AF-2S stalled clean at 96 kts indicated and 83 kts, dirty. The rudder was hydraulically boosted with 22 degrees left travel and 29 degrees right travel. Lateral control was improved by installing hydraulically powered flaperons. Pilot controlled trim tabs were located on the left aileron, both elevators and the rudder. Yaw problems were corrected by installing finettes, the two auxilary vertical fins on the horizontal stabilizer. A fence on the bottom of the aft fuselage was used by Grumman to improve spin recovery characteristics on their propeller driven aircraft.

A Pratt and Whitney R-2800-48W with a four-bladed 13-foot 2-inch, Hamilton Standard propeller powered the massive Guardian. To help control the torque of the large prop in high power, low speed conditions, Grumman canted the engine 3 degrees to the right. To further improve the low speed stability, the engine was mounted with a 3-degree downthrust, similiar to the North American T-28. The cant and downthrust of the engine provided an additional benefit of allowing the pilot to enjoy good visibility on landing.

Maximum airspeed for the AF-2S was 300 kts and 315 kts for the AF-2W, with a service ceiling of 22,900 feet for both aircraft. The AF's fuel system held 170 gallons in the fuselage behind the pilot and 75 gallons in each wing, a 150 gallon drop tank could be carried under each wing. Total capacity of 620 gallons of fuel produced a combat radius for both the -2S and -2W of 525 nautical miles.

## SPIN TESTS

The AF's spin characteristics were tested during BIS (Bureau of Inspection and Survey) trials in early 1952 after the aircraft had been in squadron service for over a year. Two well known pilots were involved in testing the AF, LTCOL Marion Carl, head of Flight Test Division of NATC and LCDR Eric Brown, RN, who was on exchange duty to NATC. The spin-test aircraft was AF-2S, BuNo 123090, which Grumman had equipped with a spring powered ejection seat and a spin recovery chute housed in an extension of the fuselage. 123090 arrived at Pax River equipped with the standard APS-31 radar under the starboard wing and AVQ-2 searchlight under the port wing. These were removed for the initial tests. At the conclusion of the regular tests, the AF was found to have demonstrated no particular abnormalities except that the stall lacked any aerodynamic warning and consisted of a sharp right wing drop from which the aircraft was slow to recover from the ensuing spin. Of the two versions of the Guardian, the -2S was the easier one to get into a spin, but once established, it did maintain a flatter attitude than did the -2W.

In preparation for its return to Grumman, BuNo 123900 had the spin chute and housing removed, the ejection seat disarmed, and the radar and searchlight reinstalled, bringing it back to operational configuration.

At this point, Carl thought the addition of the standard equipment would "affect the characteristics," and scheduled another series of tests. Carl later stated, "I considered this particularly critical," which might account for his having a pararaft along for the first time in six months of test flying. April Fool's Day 1952 was the day of the test, with Brown flying chase in an SNB-5. Rendezvous was at 10,000 feet over Chesapeake Bay where the tests began. Three spins, one to the right and two to the left resulted in safe recoveries. Next, starting at 11,000 feet in a right climbing turn, a right spin was initiated. Brown's account states: "The characteristics as viewed externally appeared identical to the other spins, but after 2.5 to 3 turns the nose of the aircraft seemed to rise slightly and the flatter attitude that resulted was maintained throughout some 10 to 12 turns until the aircraft hit the water. I did not see any object fall away from the AF nor could any sign of a survivor be seen in the water, although a streamed parachute was visible just under the surface of the water at the edge of the splash ring of the crashed aircraft. I made two complete orbits of the crash scene before I spotted the pilot's head bobbing in the water as he inflated his rescue dinghy."

**The AF-2S (123090) that was used for and subsequently lost during spin testing is shown here on a Grumman test flight with rockets, fuel tank and searchlight mounted under the wing.**

Carl stated that when he decided to bail out, he tried the ejection seat but the face curtain ripped away and the seat failed to fire. He next tried to bailout on the inside of the spin but inertia threw him back. He then dove out the starboard side, pulling the rip-cord as he hit the wing. He left the aircraft at an estimated 500 feet and was in the water before he had gotten one swing out of his chute. Eric Brown further states, in his account of this accident, that he felt the addition of the radar and searchlight, combined with the removal of the spin chute housing, changed the CG enough to cause the aircraft to flatten its spin after the initial rotation was established. The question of which "April Fool's Day" spin recovery was more typical of a standard squadron equipped AF-2S is a moot one. In fleet service, in defference to the delicate nature of the vacuum tube powered ASW equipment, acrobatics, and obviously intentional spins, were prohibted. Departures from controlled flight, other than those most inappropriate ones such as during "wave-offs," searchlight runs, and MAD "traps," were just not encountered.

Marion Carl continued his career to later retire as a Major General, and Eric Brown retired as a Captain after becoming the world's leading "trapper" with more than 2,400 carrier arrested landings.

What this "April Fool's Day" spin did do was fuel the ready room gossip about safely bailing out of an AF. The squadron wags would say that, in a bailout, the pilot would surely hit a finette. Then, pointing to Pax River, the wags would say, "they" knew that and that's why "they" had an ejection seat in that AF. Since ASW operations took place at low altitude and slow speed, and the R-2800 was one of the most reliable of reciprocating engines, bailouts in the fleet were a rarity, so there

**AF-2S 126789 loaded with torpedoes, rockets, and depth charges. The entire fuselage in front of the cockpit is painted flat black. (via W. T. Larkins)**

was little proof to counter these tales.

In addition to Marion Carl's bail-out, however, there is the story of LTJG Frank Scott. The author and Frank Scott were both flying AF-2Ss, with Frank leading on a routine night training mission from NAS Norfolk to Port Columbus, Ohio, on 10 July 1954. We were at 9,500 feet, just west of Elkins, West Virginia, when at 0137, flames started coming out of Frank's engine as a result of a broken master rod. After his crew bailed out, Frank dove out the port side of the cockpit. He did clear the finette, But landed in a tree where he hung in his chute in desperation for the rest of the night. Dawn's early light revealed, to his chagrin, that he was just four feet above the ground. These two stories of successful bailouts should put an end to the legend that safely bailing out of an AF was not possible.

## FLEET SERVICE

Development of tactics and aircrew training became of prime interest prior to the AF's introduction into the fleet. Concurrent with the BIS evaluation at Pax River, a pair of AFs were received by VX-1 at NAS Key West in June 1950. VX-1's role was to evaluate ASW equipment and formulate tactics to be used by the fleet AF squadrons. At the same time, other pairs of AFs were being accepted by Fleet Airborne Electronic Training Units, FAETULANT and FAETUPAC. The FAETUs mission had previously been primarily concerned with training VP crews. In the early days of VS squadrons, the aircrew training was

**AF-2S 126789 is equipped with (left to right) an AN/APS-31 radar antenna, HVAR, depth charge, HVAR, Douglas-built sonobuoy dispensers, and on the extreme right is an AN/AVQ-2 high-intensity searchlight.**

the responsibility of the individual squadron with assistance from the FAETUs. As the years progressed, FAETU took over the initial ASW equipment training of all VS aircrews.

As the AFs were introduced into fleet service in September 1950, the aircraft still had control problems best described as, "control at low speed impaired by high inertia forces which

**AF-2S 124778 on the ground at Bethpage with the last three numbers from the BuNu applied to the nose by Grumman prior to delivery to the Navy.**

**Hunter-Killer team in flight over Long Island with AF-2W in the foreground and AF-2S in the background.**

made coordination of rudder and aileron difficult." In other words, the controls were sloppy at low airspeeds. In spite of this shortcoming, the AF was needed to replace the aging TBMs and improve the ASW capability of the fleet. So in effect, the AF, a very large aircraft with questionable control at low speeds, was handed over to first tour pilots and operated day and night off the smallest flight decks the Navy had to offer. The resultant experiences gave rise to many less-than-complimentary names for the AF and for a definite desire on the part of many aviators to avoid duty with VS squadrons.

The magnitude of the AF's safety problem can be attested to by the accident record of just one VS squadron during a calendar year. The squadron flew their AF's a total of 8,485 hours during which they made 2,345 carrier landings, suffering 29 accidents. The causes of these accidents varied but did include eight barrier-crashes attributed directly to either hook-skip or slew, while an additional five aircraft were lost at sea. This works out to be an accident rate of 292.6 which is unthinkable by today's standards.

VS-24, based at Norfolk, received the first fleet Guardians on 27 September 1950 when one AF-2s and one AF-2W arrived. This was followed by the first carrier landings aboard the Wright (CVL-49) by pilots from NATC on 26-27 November 1950. Shortly thereafter, VS-24 went aboard Palau (CVE-122) on 18-20 December for what was the first carrier qualification

**Production AF-2W 123091 with a Grumman test pilot at the controls.**


**The last production model, the AF-3S, was equipped with MAD gear (AN/ASQ-8). Grumman test ship 129243 is seen with its Magnetic Anomaly Detection (MAD) gear extended from its fuselage fairing.**

of an AF-equipped squadron. The first VS pilot to make a carrier landing in the AF was VS-24's CO, CDR H. S. Jackson.

During 1951, deliveries of the AF continued but at a relatively slow pace, with just three more VS squadrons accepting the aircraft. For these first years of service, the normal aircraft complement of the VS squadrons consisted of nine -2Ss, nine -2Ws and one SNB. The SNB was a squadron hack used for instrument check rides, administrative hops and cross-country liberty runs.

As the AF-3S' became available in 1953, they were integrated into the squadron complement of "Scrappers", as the attack version was called. At this time, the squadron complement was increased to 20 aircraft. When deployed aboard CVEs in the early AF years, the entire complement of squadron AFs went. When the HS squadrons started to deploy their helo dets as part of the ASW task groups, the limited space aboard the CVE forced a reduction in the number of AFs deployed to 14. This shipboard complement usually included seven of each version with the remaining squadron AFs being left ashore. This limitation of squadron capabilities, combined with the normal non-availability rate that would increase with each aircraft accident, lowered the effectiveness of the VS squadrons and the entire ASW task group. It was only when the Essex-class CVS became available that the VS and HS squadrons were able to bring their full complement of aircraft aboard.

As usual, the first days at sea with a new aircraft uncovered many problems. Some of these had been in evidence during initial evaluations at Pax River, such as the tailwheel problems and the reduced effectiveness of the brakes. Squadron maintenance departments were not only faced with learning the new aircraft, but were being called upon to incorporate needed changes. Tailwheel problems were solved by replacing the the tailwheel

**AF-3S 129246 on the ground at Bethpage with the MAD boom retracted.**

with a new dual wheel unit with a longer shock strut, which made the tailwheel non-retractable. The tailhook release mechanism was rerigged and the U-4 "Hydrolube" hydraulic fluid was replaced with type U-2 fluid which would not eat the rubber seals in the system. The brakes continued to be troublesome and had to be replaced every 120 hours. Because of the frequency of replacement a shortage soon developed.

In spite of the initial teething problems, the value of the AF and its ASW equipment was proving itself. An early VS-24 historical report states: "operating around the clock for 17 days, the greater flexibility and comfort of the aircraft coupled with the capabilities of the submarine detection devices installed, brought out the basic fact that submarines could be detected and destroyed with greater efficiency and comparatively lengthy searches could be flown with a minimum of pilot fatigue in the AF type aircraft."

Most of the VS pilots were familiar with the TBM, either from previous squadrons or the Training Command when advanced training was given in the "Turkey". For them, the transition to the AF produced great impressions. Mainly they were the huge size, vastness of the cockpit, slower rate of acceleration during takeoff, and once airborne, the heavier handling qualities of the Guardian. After completing eight hours of fam time, the pilot was qualified to carry aircrew and conduct aircrew training hops. Interspersed among these hops were the usual night flights, rocket and bombing flights, instrument training and FCLPs. Instrument flights involved two aircraft, the trainee and the chase / safety pilot. The trainee was required to snap a canvas sheet around the inside of the canopy. However, if the canopy was the slightest bit open the canvas sheet would get sucked out into the airstream, thus ending the instrument portion of the flight.

Rocket and dive-bombing runs were definitely tame compared to VA tactics of the time. Both were based on a 15-degree dive angle that started at 1,500 feet. The rockets were fired at 500 feet and the pull-out completed at 300 feet. At this point the AF would be indicating 180 knots. The dive for bombing was the same, but release was to take place four seconds after the target vanished under the aircraft's nose during it's pull-out. Some VS squadrons , of which VS-30 was one, took the "tame" out of this by conducting these attacks at night.

For the aircrewmen, the more adventuresome would usually choose to fly in the scrapper (killer). In the scrapper, the new aircrewman would start as the searchlight operator-bombardier and then move up to the radar operator. For the guppy (Hunter) crew, the new aircrewman started as the ECM operator and, only when more experienced, could he become the APS-20 operator.


**AF-2W 124783 shortly after roll-out at Grumman's Bethpage, New York facility. Notice the extensive flat black anti-glare panel and the large white 783 painted on the nose.**

**AF-2W 123095 tested a small fuselage mounted radome similar to that used later on the S-2 Tracker.**

## SIMULATED NIGHT HUNTER KILLER ASW MISSION DURING THE 1953-54 PERIOD

The briefing aboard the CVE started an hour before the scheduled launch time and included the two ASW search teams plus a standby crew for the guppys and one for the scrappers. There often was an additional crew whose mission was that of radio relay for those periods of the search when the search teams were beyond radio range of the ship.

The briefing information was quite standard and included weather, winds aloft, nearest point of land, PIM, radio frequencies, pertinent information on convoys and suspected subs, and the assigned search patterns. The altitude of these patterns was based on the APS-20 radar's ability to detect a snorkel-size target in the existing sea-state. This usually worked out to be an altitude of 1000 to 1500 feet. If clouds were encountered at the briefed search altitude, the flight would be conducted beneath their bases. The search pattern itself was rectangular with the long legs of 40 to 60 miles parallel to the search axis while the cross pattern legs were based on the prevailing visibility and varied between 10 and 30 miles. Because of an inherent weakness in the stability system of the APS-20, the airspeed to be flown was between 135 and 140 knots which gave the guppy a flat attitude. The guppy pilot could check his attitude by referring to the curved level mounted fore-and-aft., above his starboard console.

While the briefing was underway in the CVE's forward ready room, the flight deck was being spotted for the launch. The large size of the AF required meticulous deck handling to avoid "crunches". For the trip topside on the elevator, the AF had to be spotted precisely on marked spots, and to further ensure clearance, the plane captain would hold full right rudder for the ride topside. As for the deck spot itself, normally an AF-2S was spotted on the port H-4 catapult and the lighter guppy would be on the shorter, starboard H-2 catapult. Since the process of spotting an AF on the H-2 cat involved man-handling the aircraft backwards to be hooked-up, this cat was normally used just for the prelaunch spotted guppy, all other launches would be from the H-4 cat.

When the call to man aircraft was heard, it was a quick trip to the rear of the ready room, out the passageway to the catwalk and up the ladder to the unlighted flight deck. Here, a careful walk would get the crew to their aircraft where the pilot would perform a pre-flight inspection. However, since the AF was painted glossy sea blue in color, this check conducted by the red light of the pilots flashlight was perfunctuary at best. The pilot would clamber up the port wing root, step over the canopy rail to get into the cockpit where he would stow his plotting board, communications packet, and the box lunch that seems to have been an integral part of the ASW mission. The pilot's seat was located on the left side of the cockpit and the space made available by the deletion of the second crew member from the cockpit, allowed for a wider than normal side console which, in addition to containing the usual radio gear, wing-fold controls, etc., also allowed that box lunch to be spread out, picnic style by the more genteel of our Guardian gourmets.

During the pilot's pre-flight of the cockpit, the plane captain would help him with the adjusting of the parachute harness. After its fit was satisfactory, procedures called for the pilot to get out of the harness until after becoming airborne. This was done to prevent the possibility of the chute being opened in the helicopter's down-wash during a rescue at sea. Flight deck procedures also called for the canopy to be left open until the AF was safely airborne. This was done so that the pilot could position his seat in the full up position in an attempt to obtain the best over-the-nose view. For the six foot and over pilot, this position put the top of their helmets up into the slip-stream.

Twenty minutes before launch time, the call to start engines would come. This entailed throttle 1/8th. open, aux. fuel pump on, turn engine over for 16 blades (to insure against "liquid lock"), ignition on both,prime, and after engine fires, mixture control to rich. After waiting for the oil temperature to rise above 30 degrees C., the engine would be run-up and checked. The aircrew would use this warm-up period to turn on the inverters to start the electronic gear's warm-up cycle. Presently, a plane director would come to the port side of the cockpit and the pilot would signal the status of his aircraft and of the ASW gear. If all was up, he would be signalled forward to spread his wings and lower his flaps in anticipation of the launch.

The plane guard helicopters of the day were not cleared for ship-borne night flying, so the responsibility was taken over by the destroyers. Night ops called for a minimum of two DDs to cover 2 of the 3 plane guard positions specified in NAVAL TACTICAL PUBS. According to which phase of the carrier operations being conducted, either take-off or landing, the plane guard positions were: 15 degrees relative and 1000 yards, 165 degrees relative and 1000 yards for take-off and 270 degrees relative and 1200 yards for landing. The pilots used this last position to determine his 180 during final approach.

While waiting for the launch to start, the pilot of the AF would keep the throttle advanced to about 800-1000RPM so as to keep the aircraft's two generators on-the-line. After the first aircraft was launched from the H-4 cat, the succeeding ones were taxiied onto the cat. Here, while the pilot held the brakes, the catapult bridle and hold-back ring were attached to their fittings on the aircraft. The pilot would then release the brakes and the aircraft would be tensioned up. Quickly the green wand of the launching officer would appear and signal for a full power run-up. Bracing his head against the rest and locking his right hand behind the stick, the pilot would advance the throttle to 62.5 inches MAP with his left hand. A quick check for 2800 RPM would follow and if all other indications appeared normal, his left hand would move up to the canopy sill to turn the navigation lights master switch on, before dropping down behind the engine controls to keep them from

slipping aft. Thus braced he watched the green wand of the launching officer swing forward in its familiar arc to touch the flight deck. The pilot's anxious wait ended with that sensation of being pulled-down before the hold-back ring broke followed immediately by the pull of the catapult along its track, to throw the aircraft off the bow. After becoming airborne, the pilot started his clearing turn, raised the landing gear and if at a safe airspeed, reduced the engine power to 50" MAP and 2600 RPM. Then he lowered his seat to keep from getting "whacked" in the back of the head. He closed the canopy and as altitude permitted, milked-up the flaps. The pilot would then proceed to his orbit area and as he climbed above 800 feet (minimum safe bail out altitude), procedures called for the pilot to loosen his seat-belt and shoulder straps and climb back into the parachute harness. However since he was not going to be above 1000 to 1500 feet during the flight and had to be back out of the parachute harness for landing, some pilots (author included) didn't think much of all this thrashing about while encased in a "poopy-suit" and instead chose to sit on their parachute throughout the ASW mission.

After "join-up", the guppy pilot would turn his nav lights off and the ASW gear in both aircraft was checked. If all ASW gear was up, the standby aircraft on deck would be shut down and the crew probably assigned to the next launch. Conversely, if enough ASW gear on either aircraft was down, the respective standby would be launched and the downed aircraft recovered with the search teams from the previous launch.

During these night ASW searches, some guppy pilots used the technique of signalling with their flashlights to alert their scrapper of the beginning and end of search pattern turns in an attempt to help the scrapper pilot avoid vertigo. At each turning point, the guppy pilot was frequently required to radio CIC that he was turning. During one exercise, all this radio chatter allowed one of our "enemy" subs to use it to his advantage. This particular night, the victimized aircraft received a call from someone using the Admiral's tactical call sign and was asked to identify two surface targets. Using the standard ASW tactic, the scrapper illuminated both targets and dutifully, reported their course and speeds. Since all of this took place beneath the line-of-sight umbrella of the carrier's UHF radios, CIC was unaware of this activity until after the aircraft returned aboard. Before morning, both targets were "war game torpedoed" and the affected, red-faced pilots taken severly to task! Thereafter all incoming radio messages were to be authenticated! The added burden of laboriously unscrambling a radio message by using a decoding sheet that was illuminated from a flashlight that was hanging around your neck while continuing to fly the aircraft, made this guppy pilot fervently hope that all night ASW search flights would be uninterrupted by incoming radio traffic.

The guppy was the primary search aircraft and relied on both its radar "eyes" and ECM "ears", while the scrapper's role was passive until called upon to investigate and possibly attack detected targets. The first contact with a sub in the search area was usually made by the ECM operator. The ECM equipment consisted of an APR-98 Countermeasure Receiver and an APA-70 Bearing Indicator which would give the operator either a right or left bearing indication relative to the intercepted radar signal. There were six different tuning heads needed to cover the entire range of submarine radar frequencies, but only one tuning head could be installed in the guppy for any one flight. This restriction obviously limited the scope of the ECM capabilities of the guppy. During the flight, the ECM operator manually scanned through the band of frequencies covered by the installed tuning head and when a signal was intercepted, he called for a hard 90 degree turn into the direction of the signal. The trick here was to get the aircraft turned quickly enough so that a second intercepted signal would resolve the ambiguity problem. On those rare occasions when the ECM operator could work against a steady signal, it was easy to pin down the sub's bearing. Unfortunately, the subs usually made just 2 or 3 sweeps with their radar. More often than not, instead of obtaining precise bearing information, the ECM would only be able to determine a sector that in turn, would be more closely scuntinized by the the guppy's radar operator. Despite these limitations, the pilots and aircrew of some squadrons, notably VS-20, 22, 24, and 31, reported enthusiasm for, and success with, their ECM gear. All agreed that denying the submarines unrestricted use of their radar, for fear of detection by airborne ECM equipment, severly hampered a sub's effectiveness, thereby fully justifying its extensive use.

When an APS-20 radar contact was detected, and evaluated as worthy of further investigation, the guppy's radar operator would detach the scrapper with a vector to the contact. Since the guppy would usually continue on the search pattern, its radar operator was immediately involved in a complex relative motion problem concerning the scrapper and the radar contact while he, the APS-20 operator, continued to maintain overall radar surveillance of the assigned search area. He had to acquire the scrapper on his radar as it flew away, usually on a divergent course, while keeping an eye on the target which was often a "blinker" (visible only on every fourth or fifth APS-20 radar sweep). More often than not, he had to supply several course corrections before the scrapper acquired the target with its APS-31 radar. Furthermore, when the target was evaluated as a non submarine, he had to determine the correct vector to enable the scrapper to rejoin with the guppy. Now the reader can begin to understand why the guppy radar operators were the elite of the aircrew.

The scrapper pilot, after turning to the heading of the initial vector, would descend to 500 to 700 feet and increase the airspeed to about 180 knots. He would fly that initial heading, and subsequent correcting vectors, until such time as the target was acquired by his radar operator. When the scrapper's APS-31 radar operator established contact, he began to issue continuous vectors to bring the scrapper over the target. At a predetermined distance from the target, usually 1.5 to 2 miles, the port wing-mounted searchlight (AVQ-2)

was lighted by the scrapper's second aircrew member, the bombardier. His job was to visually acquire the target through the scrapper's periscope, while the pilot concentrated on flying his instruments. The periscope / bombsight consisted of a periscope (Mk 41 Mod 3) that projected through the bottom of the scrapper's fuselage, aft of the trailing edge of the wing, and with its controls located in the aft-most second crewmember's compartment. The periscope was used to establish a line-of-sight for the bombsight (Mk 23 Mod 6) which was mounted atop the periscope. This unit was electronically interconnected to the searchlight to cause the searchlight to follow the motions of the periscope in both azimuth and elevation. As the bombardier tracked the target, azimuth bearing information was transmitted to the pilot's Direction Indicator (PDI). The pilot would make the necessary heading changes to keep the PDI needle centered. The PDI was physically located on the glareshield to the right side of the rocket projectile sight. This remote location forced an additional burden on the pilot to include the PDI in his instrument scan and thereby, in the author's opinion, was a contributing factor in many of the accidents where the scrapper and crew were lost during searchlight runs. When the scrapper reached the release point established by the bombsight, the bombardier released the four, wing-mounted depth charges at preselected intervals.

If this had been a daytime attack, the ASW 5" rockets would have been the preferred weapon to use on a surfaced or diving boat. These rockets had a double-ogive head and were to be fired at a range of 300 to 500 feet in a 15 degree dive angle. The aiming point was the water, about 50 feet short of the boat. Entering the water here, the double-ogive head would cause the rocket to flatten out it's trajectory and still have enough velocity to pass through both hulls of the sub.

If no visual contact was established upon the scrapper's arrival over the target, this became the datum point, and a sonobuoy pattern would be started. This pattern consisted of dropping a SSQ-2 sonobuoy and smokelight at the datum, and then rolling into a standard rate turn to the left. After 180 degrees of turn, the bank was decreased to half-standard rate and as the scrapper turned through each succeeding cardinal-heading, another sonobuoy and smokelight would be dropped. When the pattern was complete, it consisted of a sonobuoy and smokelight at datum and additional sonobuoys and smokelights at each cardinal-point, 2000 yards from datum. Monitoring the pattern, by listening to each buoy's preselected frequency, the operator would listen for the sound of cavitations made by the sub's screws. He could, by counting the number of cavitations heard over a period of time, estimate the speed of the sub. Then by comparing the volume of sound coming from one sonobuoy against the sounds from the others, an estimate could be made of the location of the sub and its course. Based on these estimates, a decision would be made as to where to drop the Mk 34 homing torpedo carried in the scrapper's torpedo bay. The Mk 34 required a drop from 300 feet at a speed of 150 knots to achieve best results. This torpedo was a development of the World War II, Mk 24 "Fido", and like "Fido" was passive. Additionally, it was about twice as heavy and half as fast as its immediate ASW successor, the Mk 43.

The installation of MAD equipment aboard the AF-3S greatly increased its capability to pinpoint a sub's position and thus led to a modification in tactics. The MAD-equiped scrapper would orbit its sonobuoy pattern at an altitude that varied between 200 and 400 feet, depending on the individual pilot's agressiveness during that flight. A MAD contact resulted in the operator firing a retro-cannon to mark the MAD contact with a combination smoke-float / flare marker. The aircraft would make an immediate 270 degree turn to port, to bring it back over this new datum. If a second MAD contact was made, it would be marked and after another 270 degree turn to port, the Mk 34 would be dropped.

MAD gear also led to a barrier search tactic that was reminiscent of the famous World War II MAD barrier across the Straits of Gibraltor and flown by the PBYs of VP-63 in 1944. In this carrier version, an AF-3S scrapper would be deployed to continuously sweep the area ahead of the ASW task Group. Again, because of the short range capability of the MAD gear, the pilot was called upon to fly as low as 200 feet to be most effective. The most vivid memory of this search tactic is that of having to climb to enter the ship's 400 foot, "Charlie" pattern for recovery.

After completing the ASW search, since the AF was not equipped with TACAN, a combination of DR navigation, radar vectors, and the carrier's YE was used to locate the ASW Task Group. Here, dependant upon the specified lighting conditions that the group was operating under, the carrier could be differentiated from the other ships by some combination of its ID and two truck lights. Usually the returning search teams would arrive overhead three hours after their launch, just prior to the launch of the relieving aircraft. In spite of some attempts to use a down-wind break for night ops, the standard day time pattern remained in use and started with the returning sections entering the "Dog" pattern at 1000 feet with their tailhooks extended and flying a left turn race-track pattern based on the planned recovery heading. In deference to the darkness of the night, the returning aircraft usually did not form up into divisions. As the launch sequence was nearing completion, "Prep Charlie" would be radioed to the recovery aircraft and they would descend into the "Charlie" pattern. With their canopies and forward crewmen's hatches open, and tailhooks extended, the aircraft would fly by the ship's island on the recovery heading and at 400 feet and 120 knots. The lead aircraft would break thirty seconds upwind of the carrier and was followed at that same interval by the remainder of the flight. At the break the pilot would simultaneously start a standard rate turn to the left, reduce power and turn his nav lights on. During this turn to the downwind leg, the pilot would drop the landing gear and extend full flaps. He would roll out of the turn on the reciprocal of the recovery heading and fly downwind until over the de-

stroyer positioned 1200 yards off the carrier's port beam. At this 180 degree position, he should be at 200 feet indicating 90 knots and would start a standard rate turn towards the ship. At the 90, the pattern called for an altitude of 120 feet and an airspeed of 85 knots which required 28 to 29 inches of manifold pressure.

It's from the ninety to the ship that the primitiveness of these night carrier ops can best be compared to today's highly refined technique. For the pilot there was no angle-of-attack indicator, no angled deck, no "meatball" and a definite scarcity of ship-borne lighting. Instead, the pilot had his airspeed indicator, stick-shaker and a radio altimeter to help him land on the deck where all four barriers would be up, thereby minimizing the length of the shortest decks in the fleet. However, above all else, the pilot did have the LSO.

In VS operations, the LSO was a squadron pilot and did have a crew of at least three. On the platform behind him, would be an assistant LSO to check on wind direction, cycles of a pitching deck, and if no "kibitzing" pilot was handy, to serve as the keeper of the LSO log. The LSO comments and the arresting wire engaged had to be entered in the LSO log. In the catwalk aft of the platform were stationed the two enlisted men who were equipped with binoculars and head-sets. The "deck spotter / talker" was linked by sound powered phone to Pri-fly and Fly-One, and used either a red or green flashlight (flags in daytime) to acknowledge the status of the deck. The "hook spotter / talker" was in the UHF radio circuit and used his binoculars to check the "all down" status of each approaching aircraft. This UHF radio circuit could be monitored by the LSO through a platform-mounted speaker and was used only during CarQuals. For night ops, the LSO discarded his familiar, red and amber striped daytime suit and used one with green and amber stripes. He also changed paddles and would use ones with a solid panel, to avoid those flapping strips that might cause confusion at night. Furthermore, as he stood on his platform, the LSO was illuminated by a platform mounted, ultra-violet light which would allow the approaching pilot to "pick-up" the LSO as early as possible. This ultra-violet light, in addition to being relatively short-ranged, forced the LSO to wear a chin-mounted shield, to keep the light source from ruining his night vision, and to give his signals with slower movements than he used during the daytime (ultra-violet light tends to blur rapid movements). The LSO tried to pick the aircraft up at the 90 with a "roger", and because of the scarcity of shipborne lighting, he normally would work on the aircraft's alignment and altitude first, and then its speed closer in. To help him, the LSO used six lights on the approaching aircraft for reference. These lights were: the two wing-tip nav lights, the two white attitude and alignment lights mounted forward and aft on the bottom of the fuselage, the blue flame from the engines exhaust, and the approach attitude indicator light mounted in the leading edge of the aircraft's port wing. This light shined through a three-colored lens cover that was red, a thin amber line, and green. This lens was set by the LSO according to the normally expected landing weight of the aircraft and had the amber line aligned with the correct attitude indicator hash mark on the port side of the vertical stabilizer. This attitude indicator light and the alignment lights were wired so that they were off when the landing gear was up, flashing if the gear was down but the tailhook not extended, and on steady only when the gear and tailhook were down.

Additionally, once the aircraft is "picked-up" by the LSO, we have an almost continuous dialogue between the LSO and his crew. As an example:

LSO to hook spotter, "All Down?"

Hook spotter to LSO, "All Down!"

LSO to deck spotter / talker, "How's the deck?"

Talker to LSO, "Fouled deck, keep 'em coming!"

LSO, "Roger"

LSO to Assistant LSO, "How's the wind?"

Assistant LSO, "Five degrees Port, 28 knots!"

LSO to talker. "How's the deck?"

Talker, "Clear deck!"

Obviously, this dialogue varied and was centered on the recovery conditions. In high sea states, the concern was with a "steady deck" at the time of the "CUT", while during light wind conditions, such as the Mediterranean is famous for, the talker kept the LSO advised of any course changes necessitated by the CVE's "chasing the wind".

Throughout the approach, the LSO used the horizon, if any, for a check on the aircraft's attitude. The aircraft's attitude indicator light and the engine's exhaust flame served as his checks on the aircraft's performance. The attitude indicator light would appear amber if the aircraft's attitude was proper, red if flat, and green if too cocked-up. The proper approach attitude was slightly more nose-high than the three-point landing attitude. The engine exhaust flame was blue in color and its size did change with the increase or decrease in engine power. As the aircraft entered the groove, the LSO would be checking the wing tip lights for wings level, the attitude light for amber (on speed), the alignment lights to make sure the aircraft was lined up with the ship, and the blue exhaust flame, being especially alert for that precursor of an impending trip to the spud-locker, the pilot's "easing gun in the groove". If all indications remained steady and right, when the aircraft reached that point based solely on his judgement, the LSO would drop his left arm to his side as he brought his right arm across his throat, signalling "cut". Simultaneously chopping the power and "popping" the aircraft's nose over, the pilot would look for the three centerline flashlights, embedded in the flight deck, to check his alignment while the suddenly silent aircraft seemingly floated towards the deck. Deck edge lighting consisted of upside down dustpan lights shining down on the deck, which the pilot utilized to determine when to pull the stick back into his stomach and to rotate the aircraft into its three-point landing attitude. The actual touchdown and wire engagement resulted in forces that varied from a "grease job" to a veritable "prang" that sometimes two-blocked the accelerometer at 5 "G"s. While the aircraft was being quickly decelerated by the engagement of the arresting wire, the pilot took advantage of having been thrown forward in

his shoulder straps to use his left hand to flick the oil-cooler and cowl flap switches open, and turn the nav lights off, while his right hand stayed on the stick, holding it back in his stomach to help keep the aircraft's tail down. Then would come the roll-back, disengagement from the arresting wire, hook - up, followed by the expeditious taxiing forward until clear of the barriers, before the satisfaction of having accomplished another night carrier landing could be savored by our pilot.

A most fitting conclusion to our simulated ASW flight is this statement from LCDR Bob Hughes USN (Ret.). Bob flew with VS-22 as an aircrewman and continued on to become a Bombardier Navigator aboard A-6s. Bob describes his AF days as:

"In retrospect, flying in the AF was a young man's job; not just young, but with the sense of indestructability that belongs to youth. My AF years were followed by 15 years in jet aircraft sitting alongside the pilot. I still vividly recall night carrier landings in the ECM seat (small window to the left - too low except to see nearly straight down), and the wonderment of having to judge what was happening by what I could hear (radio and engine sounds), and feeling the exaggerated motions of the aircraft's tail. The moment of truth was following the "cut" - the sense of floating, the relative quiet, the falling sensation, and so often the bone-jarring impact with the deck. The key thing was the total lack of any outside visual references or even instruments to provide some clue as to what was transpiring! One might argue with some validity that NOT being able to see was perhaps a blessing (ignorance is bliss), but after hundreds of carrier landings "up front", I really can't agree! But I was lucky, the pilots were good enough at their jobs so that guys like me can recount their memories many years later!"

## GRUMMAN AF GUARDIAN SQUADRON HISTORIES

In late 1946 and early 1947, to address the new ASW threat posed by the Soviet Navy's emphasis on submarines, two CVEs, USS Sicily (CVE-118) and Badoeng Strait (CVE-116) along with their newly formed air groups, CVEG-1 and -2, were assigned to the East and West Coasts respectively to conduct ASW operations and help formulate new ASW tactics. By mid-1947 the Navy's carrier ASW force had increased to three with the addition of Mindoro (CVE-120) and CVEG-3. In 1949 the Navy had seven composite squadrons (antisubmarine), VC-21, -22, -23, -24, -25, -31, and -32. In April 1950 these seven squadrons were redesignated VS (air antisubmarine). In August 1950, after the Korean War started, reserve squadron VC-892 was called to active duty and redesignated VS-892. This was followed by the establishment of VS-26 in September and VS-27 in November 1950, and the recall to active duty of five more reserve squadrons VS-801 (VS-30), -831 (VS-36), -871 (VS-37), -913 (VS-39), and -931 (VS-20) in February 1951. In early 1953 the six reserve squadrons were established as Regular Navy units and redesignated as shown in parentheses above. These squadrons completed the VS roster that would serve the fleet until 1956 when a consolidation of VS squadrons took place for budgetary reasons. Four of these squadrons, VS-23, -26, -32 and -892 (VS-38) did not operate the AF but continued to fly TBMs until they transitioned to the S2F.

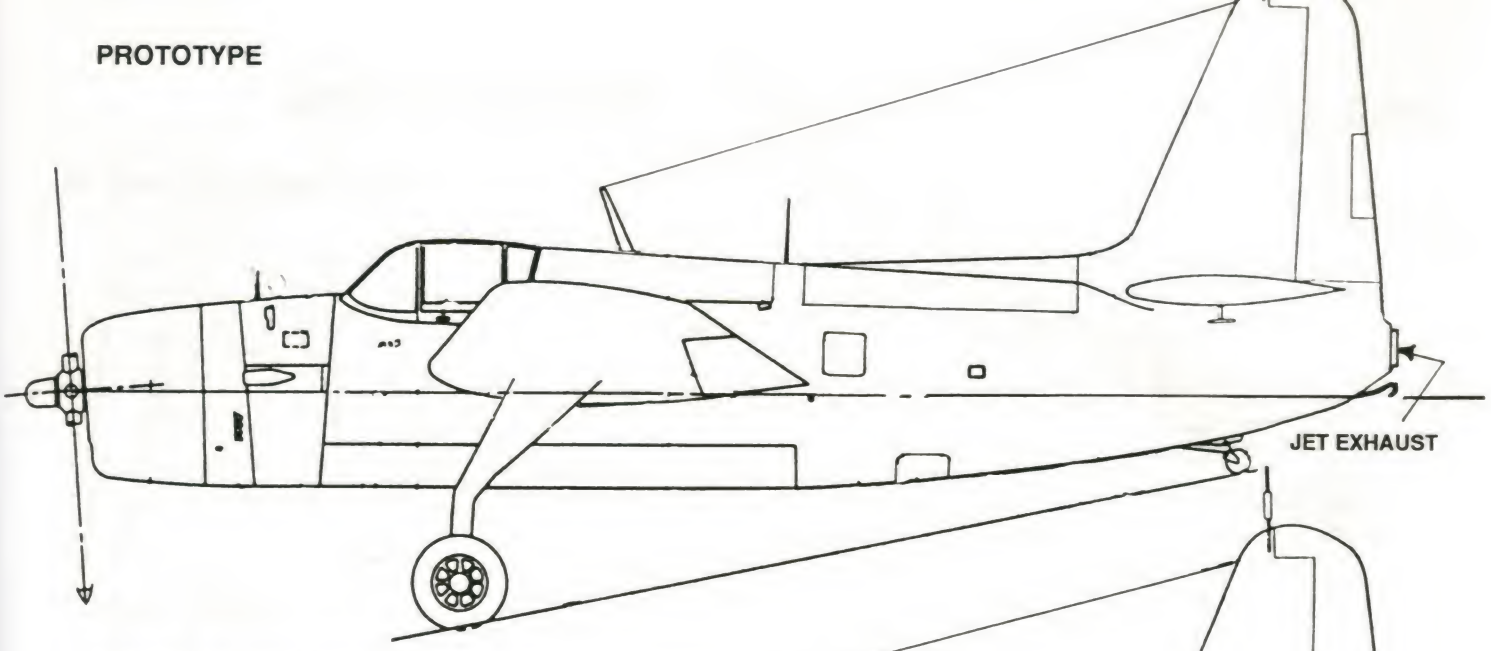
The operational histories of the AF squadrons are as varied as their lineage. Generally in the Pacific Fleet, after carquals and short training cruises aboard whatever carrier was available, the VS squadrons would make a six- to-seven month cruise to the Far East in CVEs or CVLs. Often they would be off-loaded in Japan or Guam where they would operate ashore. Because of the shortage of carriers brought about by the pressure of the Korean War, very few of the AF or TBM squadrons actually deployed for a full-term cruise in the carrier.

In the Atlantic Fleet, after similiar carquals and ASW training, the East Coast squadrons would make a four-to-six- week CVE or CVL deployment to Guantanamo Bay for further training before beginning a three month cruise to the Mediterranean. About half of these Sixth Fleet deployments involved combined NATO force ASW operations in the North Atlantic.

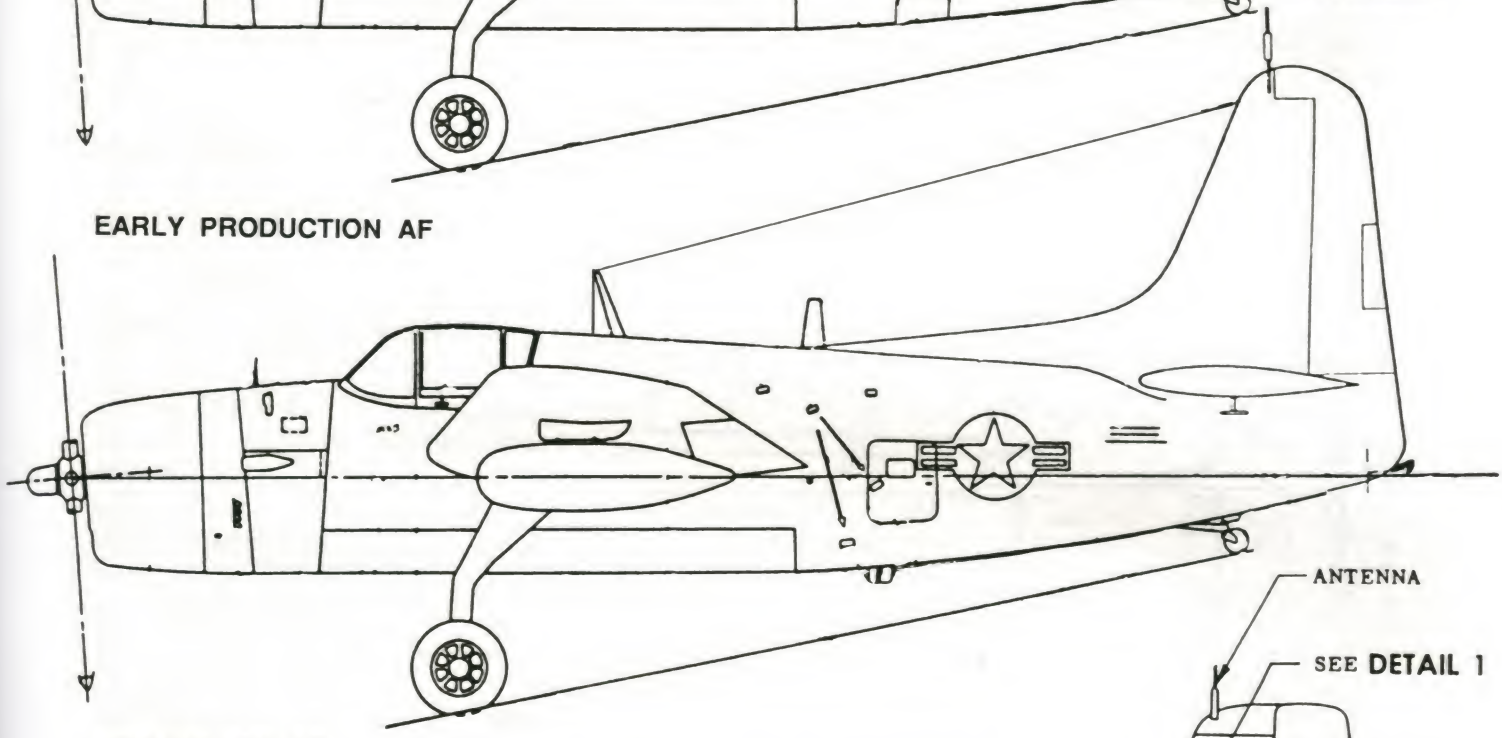
In early 1952, the Pacific Fleet assessed that the CVE was rapidly reaching its obsolescent stage. AFs required larger and faster carriers. Under light wind conditions on the CVEs, air operations became dangerous and operational losses increased. The CVL satisfied the speed conditions but was fuel / range limited and actually had a narrower flight deck than the CVE. The Essex-class CV appeared to be the best solution for an ideal ASW carrier. In August 1952, VS-21 operated from Valley Forge (CV-45) in a highly successful ASW exercise which confirmed the Navy's expectations of this class of carrier serving in an ASW role. It was not until 8 August 1953, that Enterprise (CV-6), Franklin (CV-13), Bunker Hill (CV-17), Leyte (CV-32),and Antietam (CV-36) were designated as CVSs (antisubmarine support carrier). Only the latter two were ever operational. On 1 January 1954, Princeton (CV-37) and Valley Forge (CV-45) were designated CVS and the Navy finally had an operational ASW carrier force.

In 1954, fleet squadrons began retiring the AF as the Grumman S2F-1 Trackers came into the fleet. On 31 August 1955, VS-37 turned over the last fleet AFs to the reserves. A note of comparison of the S2F and AF was made by ENS A. Jay Cristol (CAPT Ret), on the 1954-55 cruise made by VS-37 (AF) and VS-23 (S2F), in Princeton. Cristol states, "On our cruise, the S2F was not much more of an ASW aircraft than the AF. The plane was new in VS-23 and our people had a lot of training and background with the AF. In addition, the initial S2F did not have any fancy electronics which were added in later years. Without Jezebel and other sophisticated gear, we were about even. The S2F did have improved flight instruments and definitely came aboard ship better than the AF."

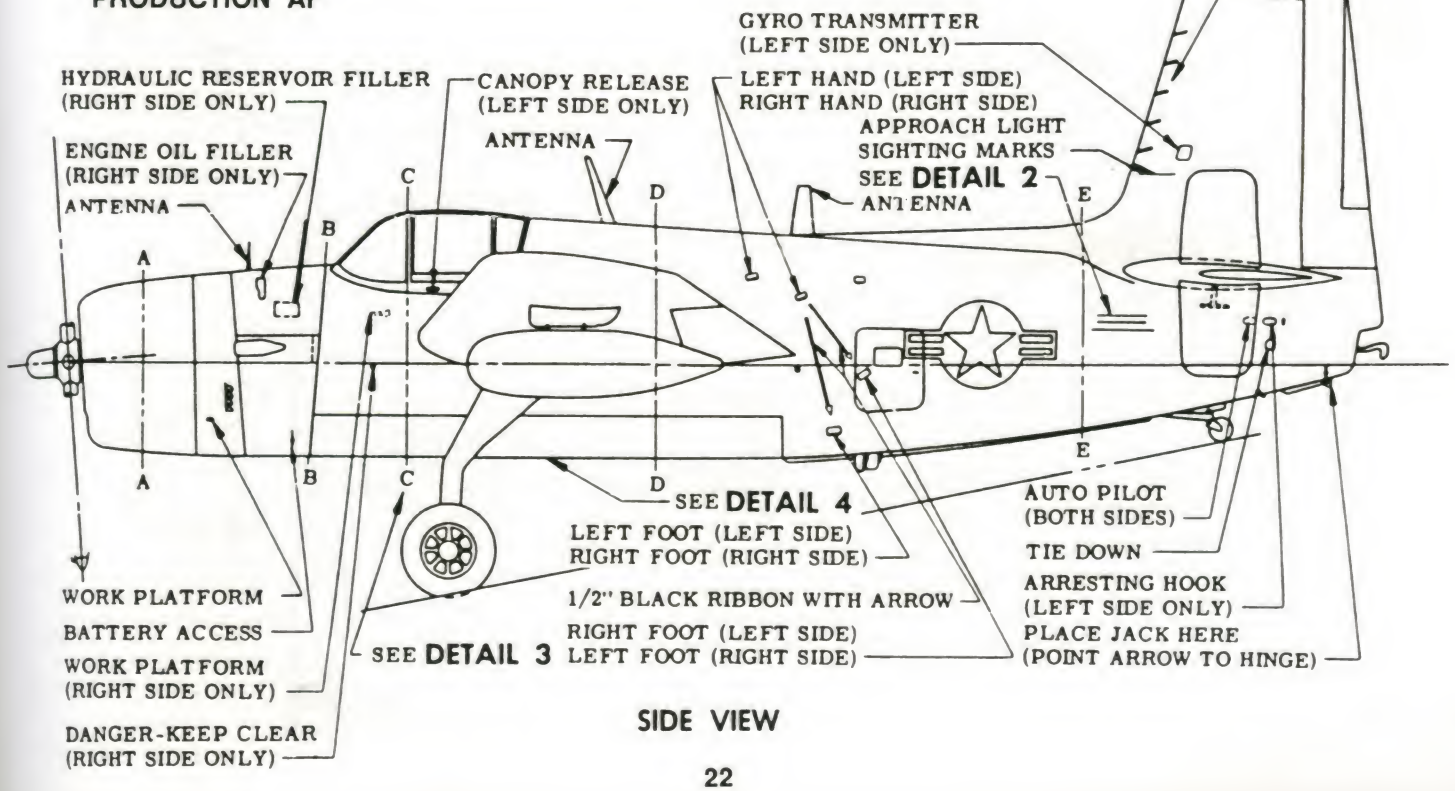
PROTOTYPE




EARLY PRODUCTION AF




PRODUCTION AF




SIDE VIEW

## WING SECTIONS

SECTION G-G

SECTION H-H

SECTION J-J

SECTION K-K

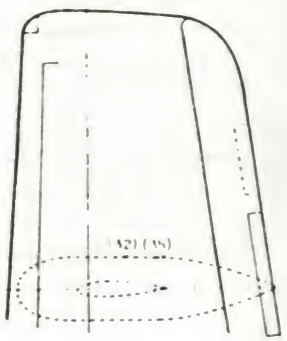
## STABILIZER SECTIONS

EARLY PRODUCTION WING TIP

SECTION L-L

SECTION M-M

SECTION N-N






TOP VIEW

### DIMENSIONS

| | |
|---|---|
| WING AREA | 549 sq. ft. |
| SPAN | 60' - 0" |
| LENGTH | 43' - 5" |
| HEIGHT | 16' - 7" |
| TREAD | 14' - 5" |
| M.A.C. | 9' - 7" |
| PROP. CLEAR | 9" |

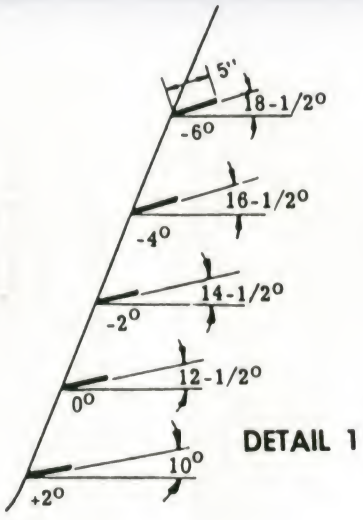
### FUEL AND OIL

| Gals. | No. Tanks | Location |
|---|---|---|
| 270 | 1 | Fuse., S.S. |
| 150 | 2 | Wing, S.S. |
| 300 | 2 | Wing, Drop |

FUEL GRADE.....115/145
FUEL SPEC....MIL-F-5572

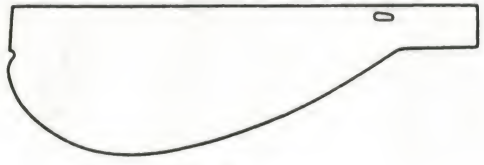
**OIL**

| | |
|---|---|
| CAPACITY (Gals.) | 34 |
| GRADE | 1100 |
| SPEC | MIL-O-6082 |



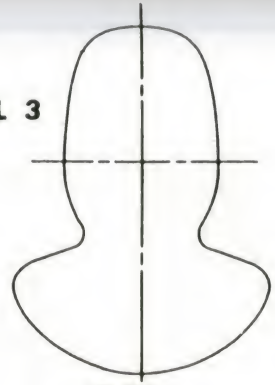

DETAIL 1

DETAIL 4



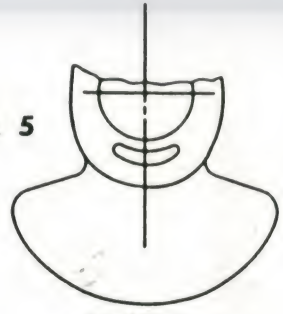
AF-2W
DETAIL OF RADOME

DETAIL 3



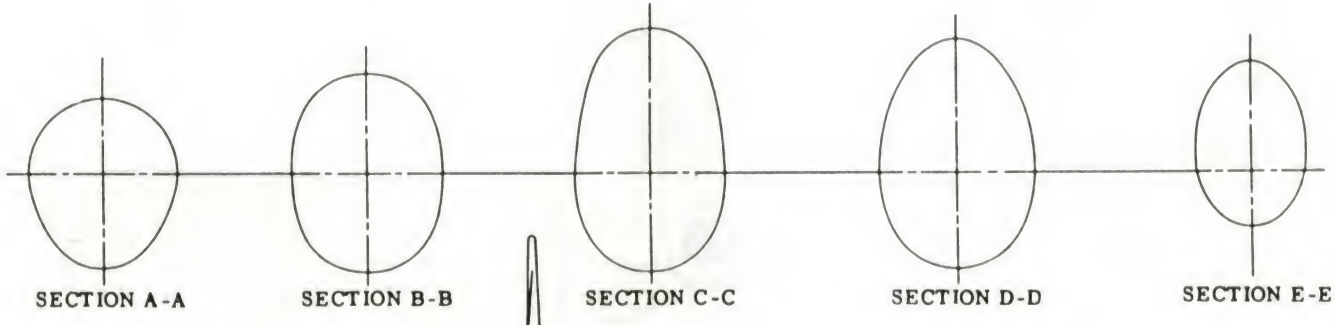
AF-2W
SECTION C-C

DETAIL 5

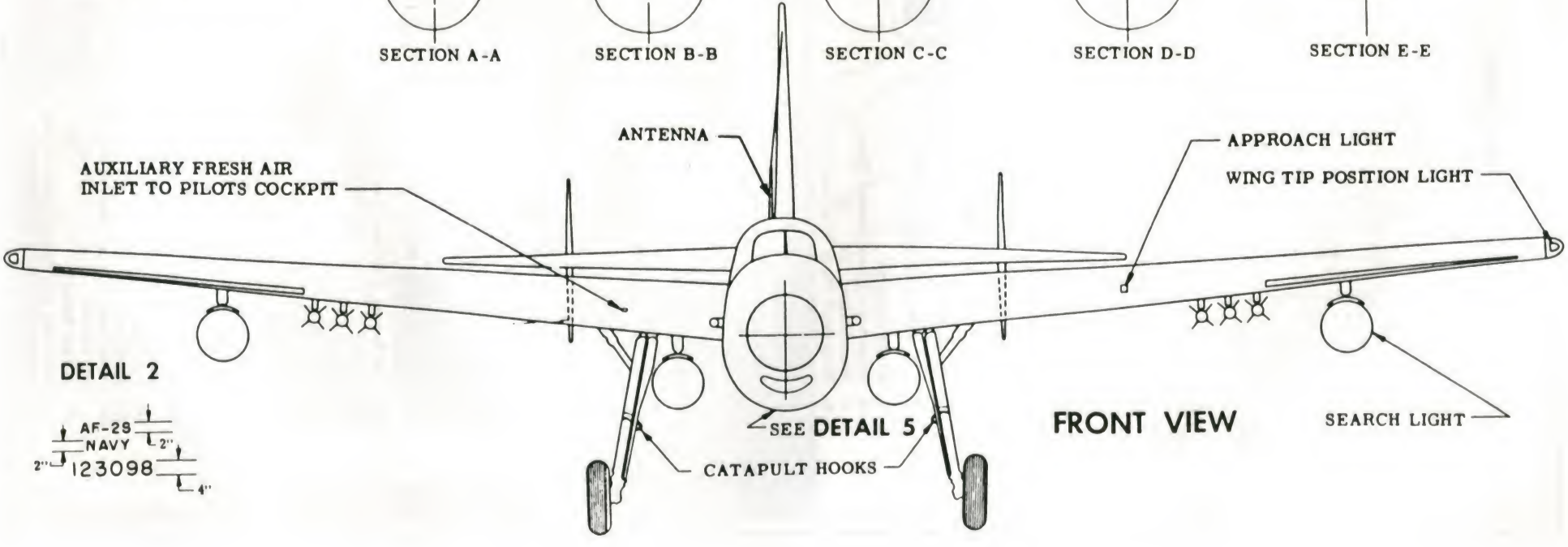


AF-2W
FRONT VIEW

# FUSELAGE CROSS SECTIONS



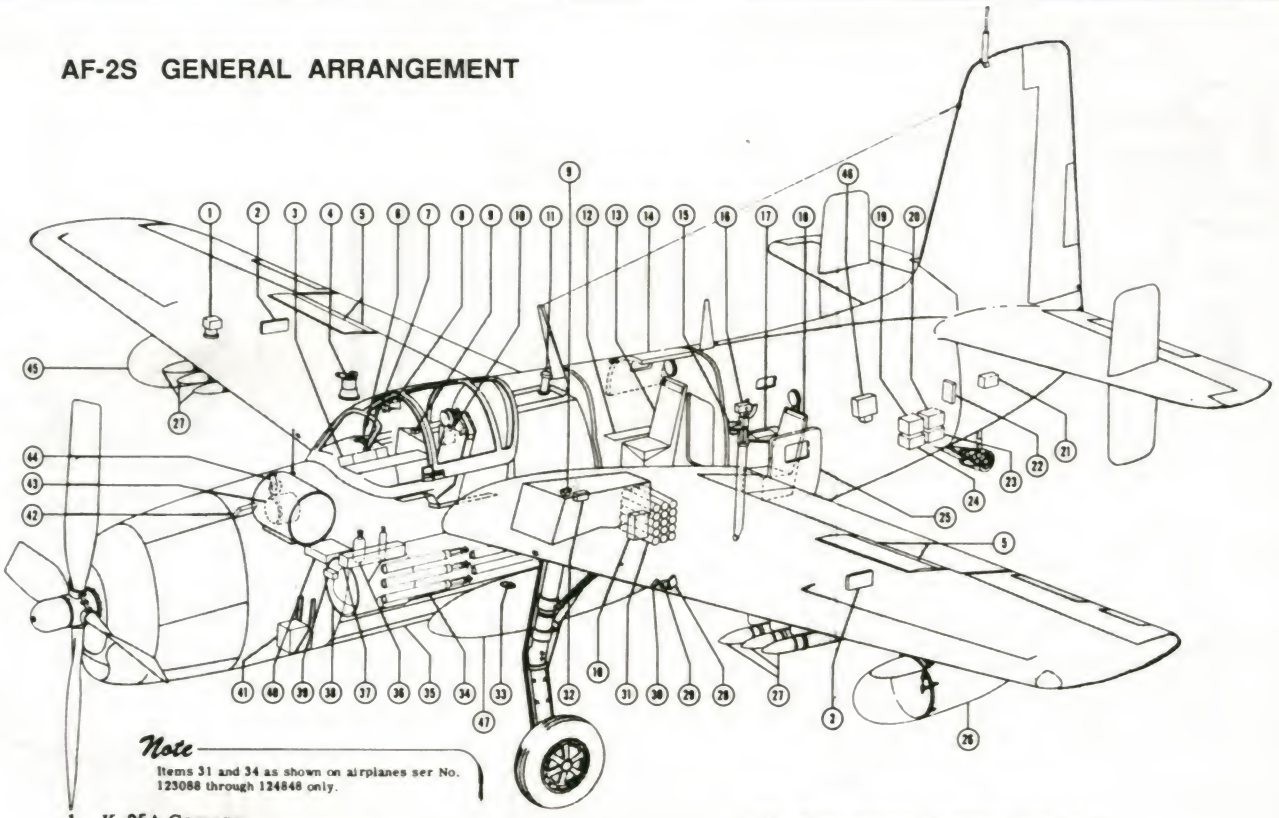
SECTION A-A SECTION B-B SECTION C-C SECTION D-D SECTION E-E




FRONT VIEW

DETAIL 2

## AF-2S GENERAL ARRANGEMENT



*Note*

Items 31 and 34 as shown on airplanes ser No. 123088 through 124848 only.

1. K-25A Camera
2. Electrical Circuit Breaker Panel
3. Rocket Sight
4. Wing Outer Panel Electrical Terminal Panel L/R
5. Flaperon and Flaperette L/R
6. Camera Flasher
7. Stand-by Compass
8. Wing Fuel Tank Filler L/R
9. Wing Center Section Electrical Connector Box L/R
10. Direct Current External Power Receptacle (Under right wing)
11. Main Fuel Tank Filler
12. Second Compartment Console
13. Radar Operator's Seat
14. Second Compartment Emergency Exit Hatch
15. Periscope
16. Bomb Sight
17. Aft Compartment Console
18. Main Fuselage Door
19. Bombardier's Seat
20. Automatic Pilot Controller Connector Box
21. Automatic Pilot Servo Amplifier
22. Remote Compass Amplifier
23. Automatic Pilot Electrical Power Connector Box
24. Tail Section Electrical Terminal Panel
25. Automatic Pilot Power Junction Box
26. Amplifier Adapter
27. Searchlight
28. Depth Bomb
29. Rocket
30. Rocket Camera
31. Approach Light
32. Stall Warning Unit
33. Auxiliary Droppable Fuel Tank Filler L/R
34. Floatlights--Airplanes ser No. 126720 and subsequent
35. Sonobuoys--Airplanes ser No. 126720 and subsequent
36. Torpedo
37. Bomb Bay
38. Canopy and Landing Gear Emergency Air Bottles
39. Storage Battery
40. Bomb Bay Electrical Connector Box
41. Firewall Electrical Connector Box
42. Main Electrical Distribution Box
43. Engine Electrical Connector Box
44. Hydraulic Fluid Reservoir
45. Oil Tank Filler
46. AN/APS-31A Radar Equipment
47. Radio Circuit Breaker Panel
48. Auxiliary Droppable Fuel Tank or Aero 2A Sonobuoy Dispenser--Airplanes ser No. 126720 and subsequent or MK 54 Depth Bomb

### SERVICING DATA

EMERGENCY COMPRESSED AIR BOTTLES
Filling Pressure: 1800 - 2000 psi
(Use compressed air, only)

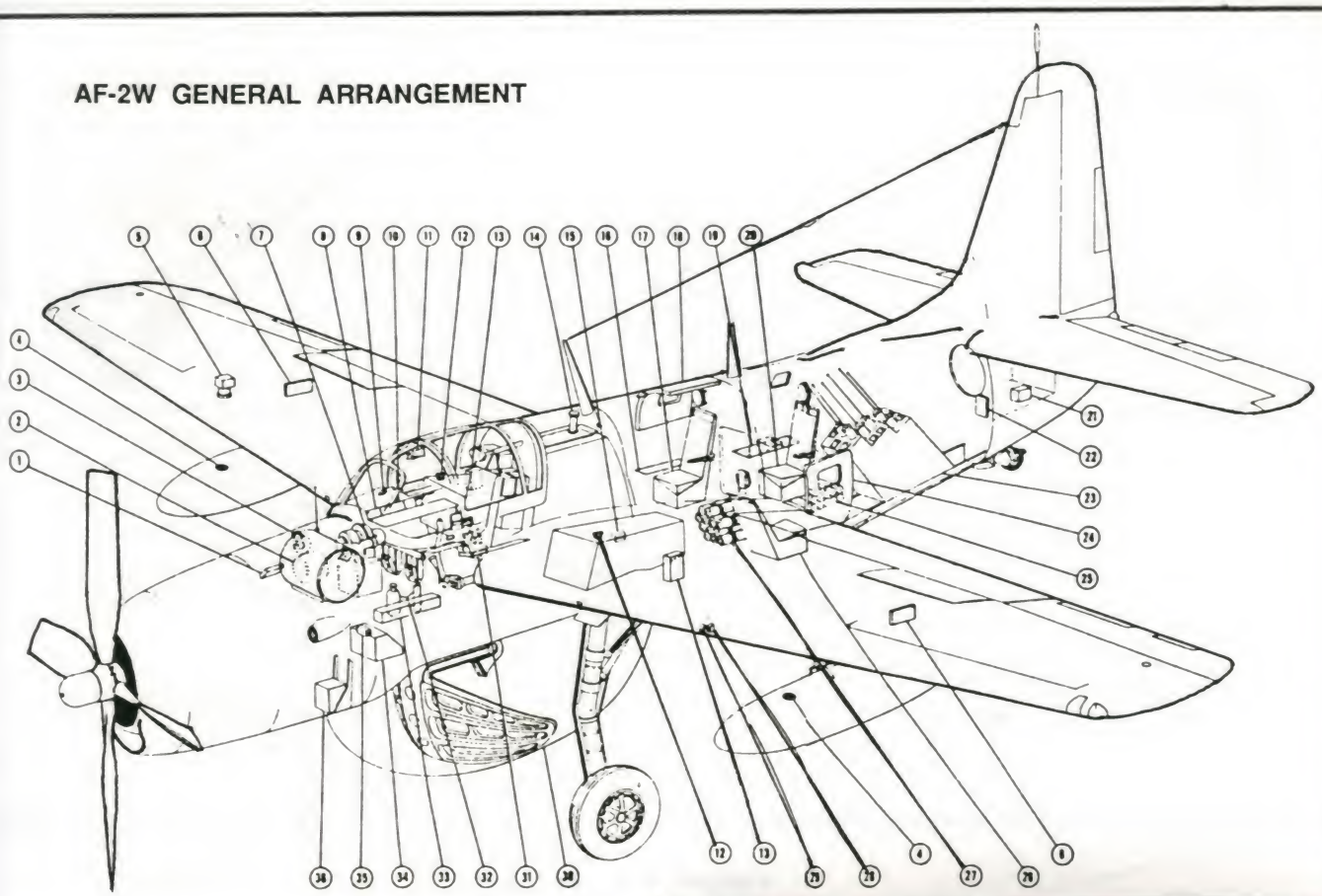
BATTERY
Add either distilled water, if available, or clean drinking water; NOT HIGHER THAN 3/8 INCH ABOVE PLATES.

HYDRAULIC FLUID
Spec: MIL-F-7083
Commercial Designation: Hydrolube H-2
Reservoir Capacity: 2-3/4 US. Gal

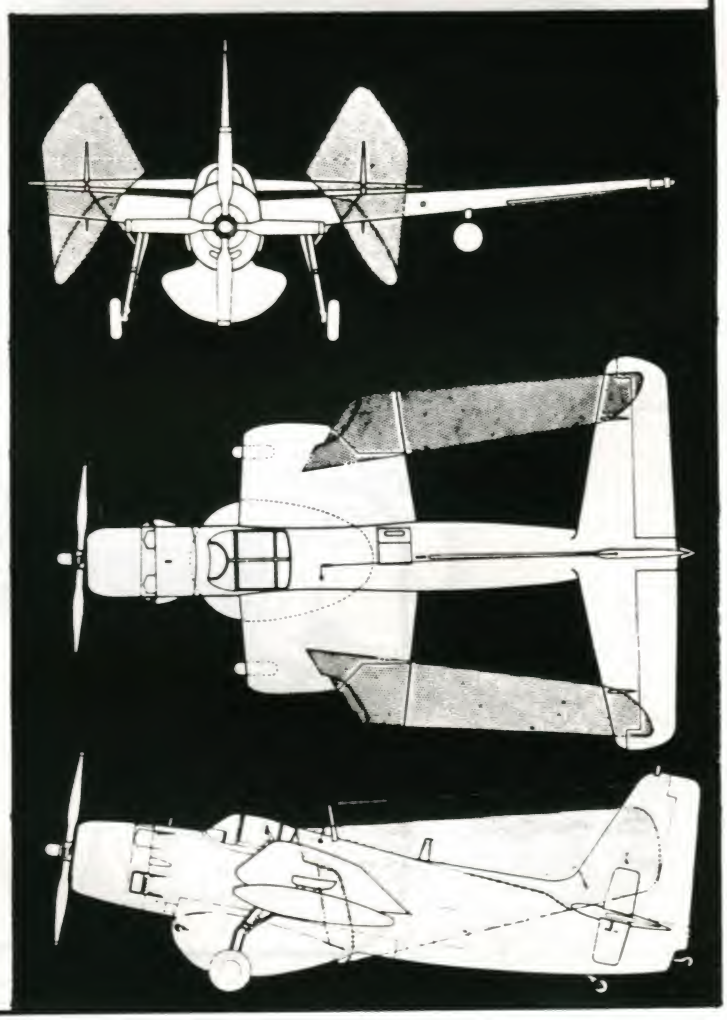
FUEL
Spec: MIL-F-5572
Grade: 115/145
Tank Capacities:
Main - 270 US. Gal, 1620 Lb
Wing - 75 US. Gal, 450 Lb (2)
Auxiliary Droppable - 150 US. Gal, 900 Lb (2)

OIL
Spec: MIL-O-6082
Grade: Summer 1100, Winter 1065
Tank Capacity: 36 US. Gal
Quantities Carried:
Attack (Normal Fuel) - 23 US. Gal
Attack (Rockets, Normal Fuel) - 23 US. Gal
Attack (Overload Fuel) - 36 US. Gal
Attack (Rockets, Overload Fuel) - 36 US. Gal

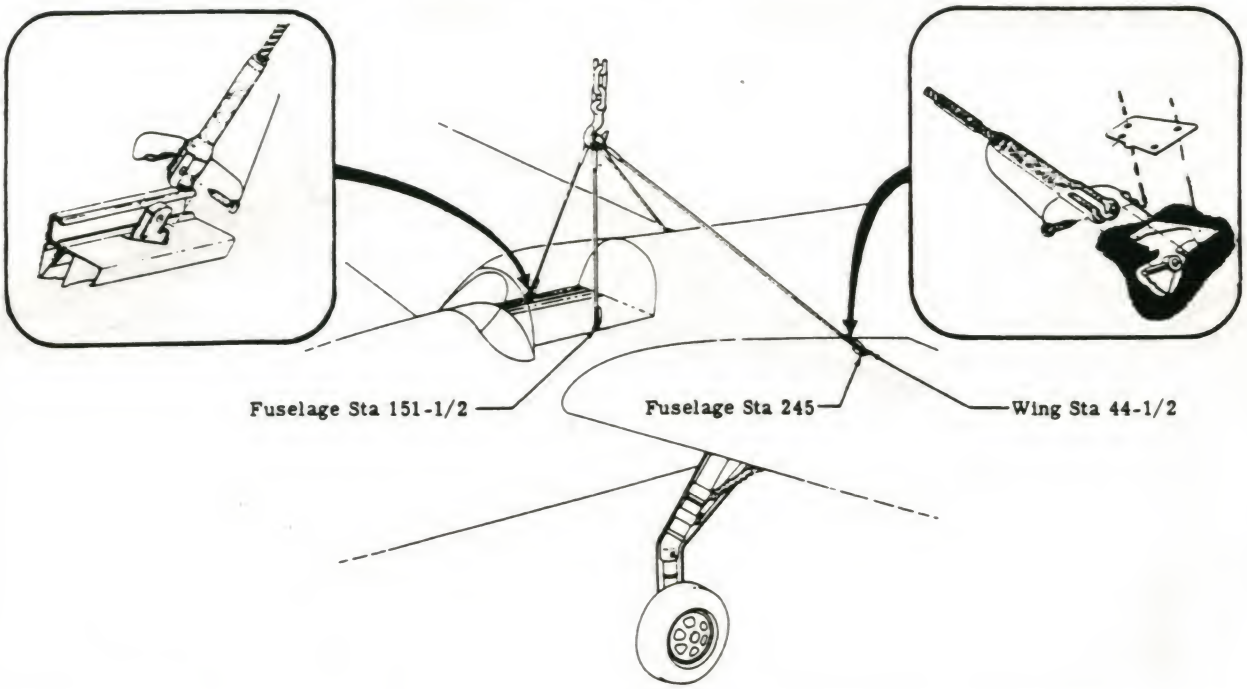
## AF-2W GENERAL ARRANGEMENT



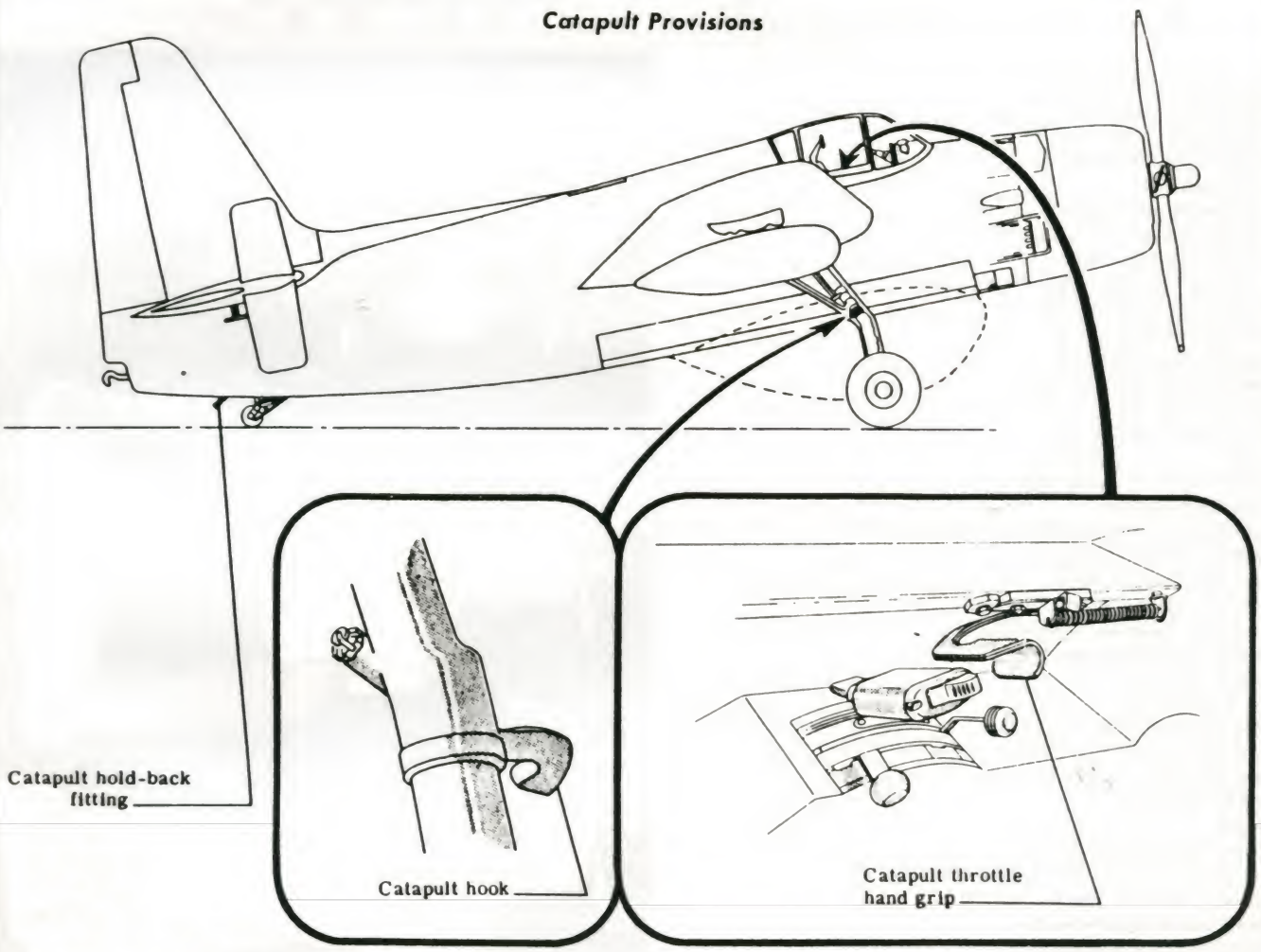
1. Engine Electrical Connector Box
2. Hydraulic Fluid Reservoir
3. Oil Tank Filler
4. Droppable Fuel Tank Filler L/R
5. K-25A Camera
6. Wing Outer Panel Electrical Terminal Panel L/R
7. Ventilating System Air Cycle Machine
8. Radio Circuit Breaker Panel
9. Heating and Ventilating System Face Oulet
10. Electrical Circuit Breaker Panel
11. Stand-by Compass
12. Wing Fuel Tank Filler L/R
13. Wing Center Section Electrical Connector Box L/R
14 Main Fuel Tank Filler
15. Direct Current and Alternating Current External Power Receptacle (Under right wing)
16. Radar Operattor's Control Console
17. Radar Operator's Seat
18. Radar Operator's Compartment Emergency Exit Hatch
19. Sonobuoy Operator's Circuit Breaker and Control Console
20. Sonobuoy Operator,s Seat
21. Auto Pilot Electrical Power Junction Box
22. Tail Section Electrical Terminal Panel
23. Sonobuoy and Float Light Chutes
24. Main Fuselage Door
25. Float Light Stowage
26. Relief Operator's Seat
27. Sonobuoy Stowage
28. Approach Light
29. Stall Warning Unit
30. Radome
31. Ventilating System Primary Compressor
32. Canopy and Landing Gear Emergency Air Bottles
33. Bomb Bay Electrical Junction Box
34. Main Electrical Distribution Box
35. Firewall Electrical Connector Box
36. Storage Battery

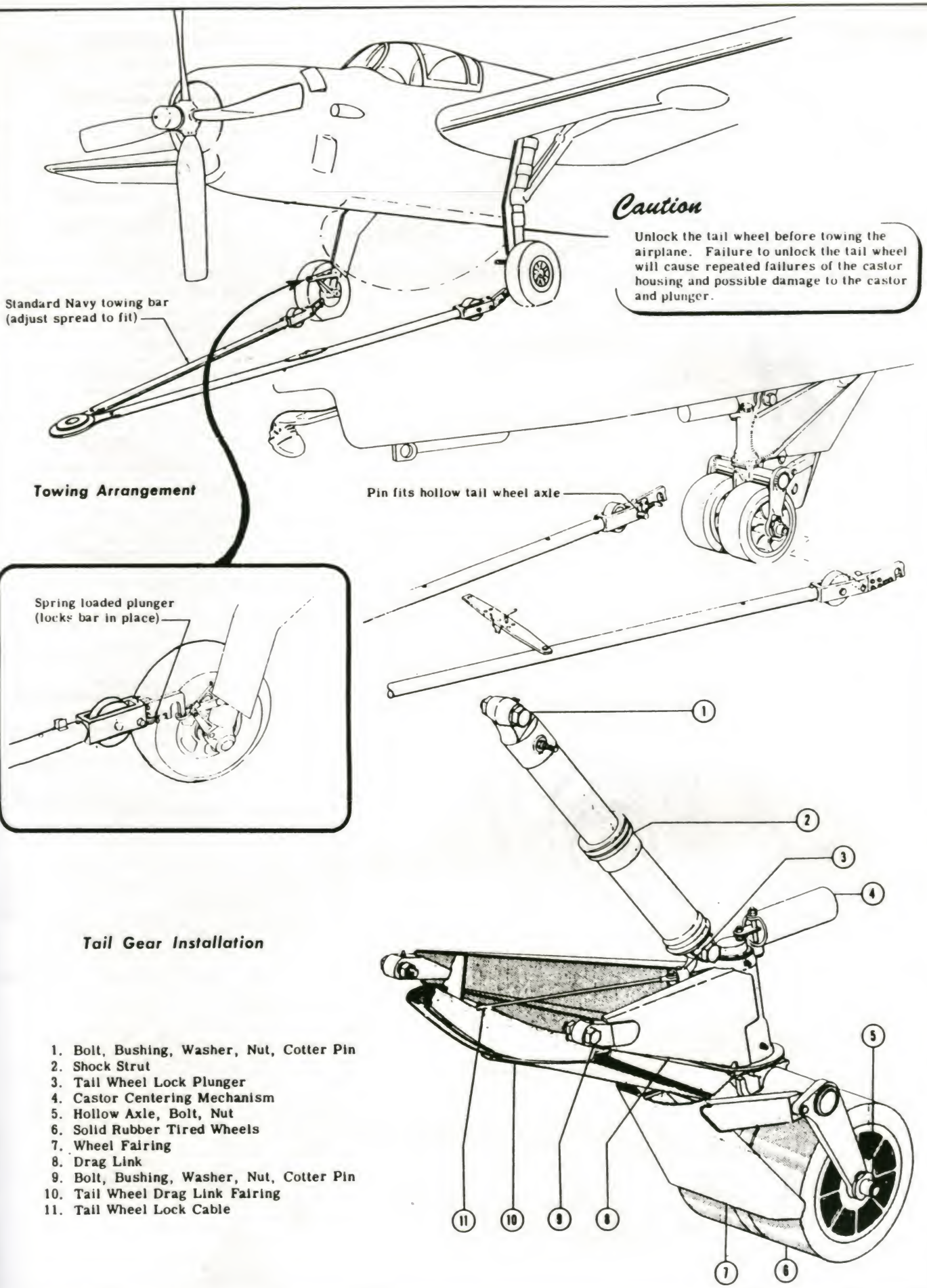


## GT-296 Sling Assembly Airplane Hoisting

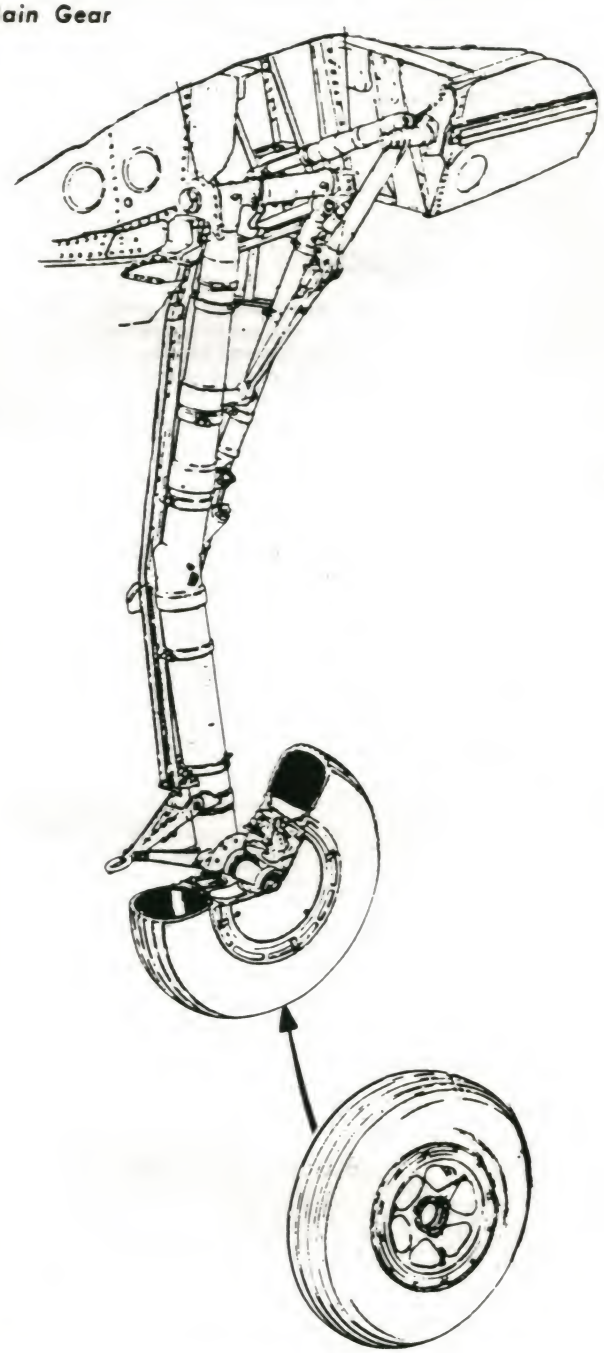



## Catapult Provisions




Caution
Unlock the tail wheel before towing the airplane. Failure to unlock the tail wheel will cause repeated failures of the castor housing and possible damage to the castor and plunger.
Standard Navy towing bar (adjust spread to fit)
Towing Arrangement
Pin fits hollow tail wheel axle
Spring loaded plunger (locks bar in place)
Tail Gear Installation
1. Bolt, Bushing, Washer, Nut, Cotter Pin
2. Shock Strut
3. Tail Wheel Lock Plunger
4. Castor Centering Mechanism
5. Hollow Axle, Bolt, Nut
6. Solid Rubber Tired Wheels
7. Wheel Fairing
8. Drag Link
9. Bolt, Bushing, Washer, Nut, Cotter Pin
10. Tail Wheel Drag Link Fairing
11. Tail Wheel Lock Cable

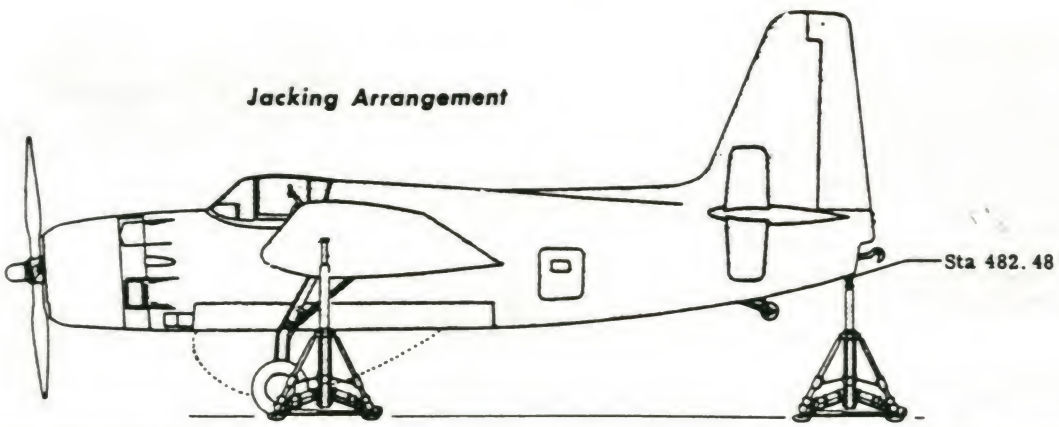
## Main Gear



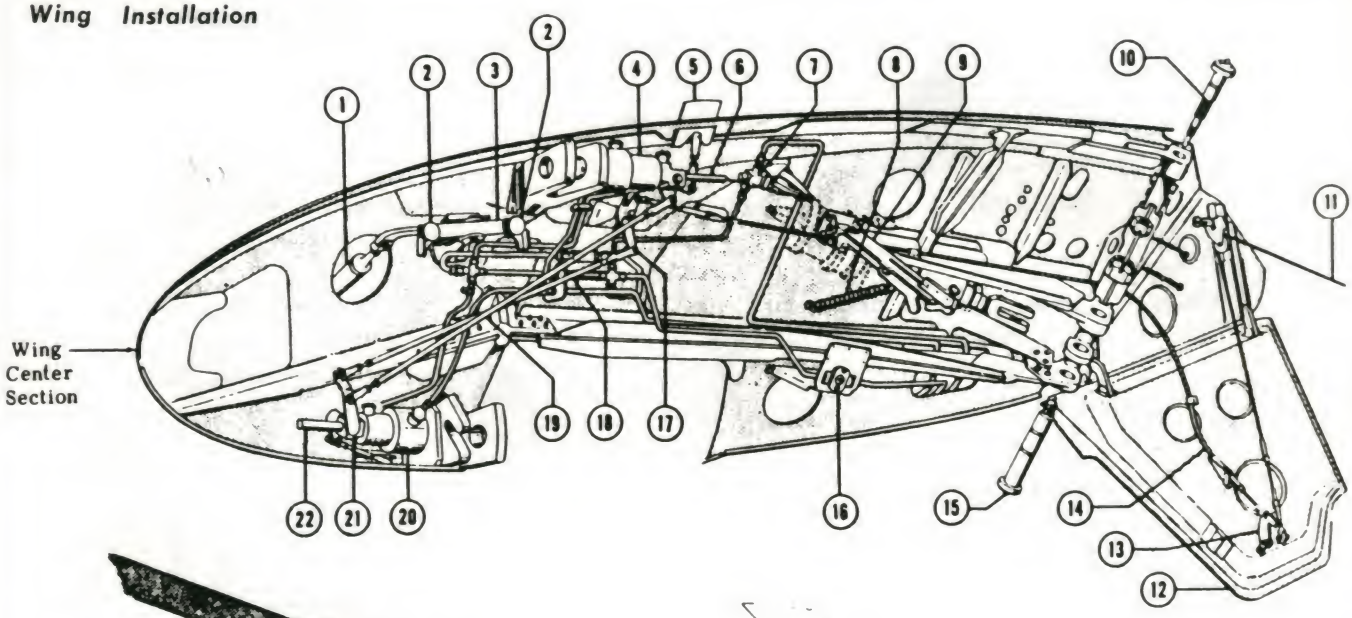
## Wing Installation

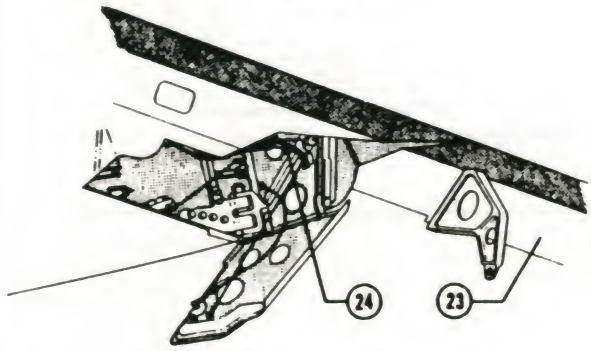
1. Aileron Push Rod
2. Bellcrank Adjustment Bolts
3. Aileron Bellcrank
4. Upper Wing Lock
5. Wing Lock Flag
6. Upper Wing Lock Piston Rod
7. Timer Check Valve
8. Aileron Neutral Positioning Tension Spring
9. Aileron Neutral Positioning Pivot Arm
10. Upper Wing Hinge Pin
11. Door Actuating Cable
12. Wing Fold Door
13. Door Release Hook
14. Door Release Cable
15. Lower Hinge Pin
16. Lower Timer Check Valve
17. Door Release Bellcrank
18. Door Release Adjustable Push Rod
19. Wing Lock Connecting Adjustable Push Rod
20. Lower Wing Lock
21. Lower Wing Lock Actuating Arm
22. Lower Wing Lock Piston Rod
23. Wing Center Section
24. Electrical Wiring Bundle
25. Flaperon Return Line
26. Landing Gear Down Line
27. Flaperon Pressure Line
28. Wing Flap Down Line
29. Wing Flap Up Line
30. Aileron Tab Control Rod Tension Spring
31. Wing Fold Joint Hydraulic Swivel
32. Hinge Pin Axis Cover
33. Aileron Tab Control Rod
34. Aileron Tab Arm Positioning Cable
35. Pitot Static Line
36. Radar Flexible Shielded Conduit
37. Gust Lock Cables
38. Landing Gear Emergency Dump Up Lock Cable
39. Wing Fold Actuating Arm Assembly
40. Drop Tank Fuel Line
41. Wing Folding Actuating Cylinder
42. Upper Wing Fold Hinge
43. Aileron Neutral Positioning Arm Assembly
44. Aileron Neutral Positioning Torque Tube
45. Upper Wing Fold Lock Fitting
46. Lower Wing Fold Lock Fitting
47. Lower Wing Fold Hinge

## Jacking Arrangement

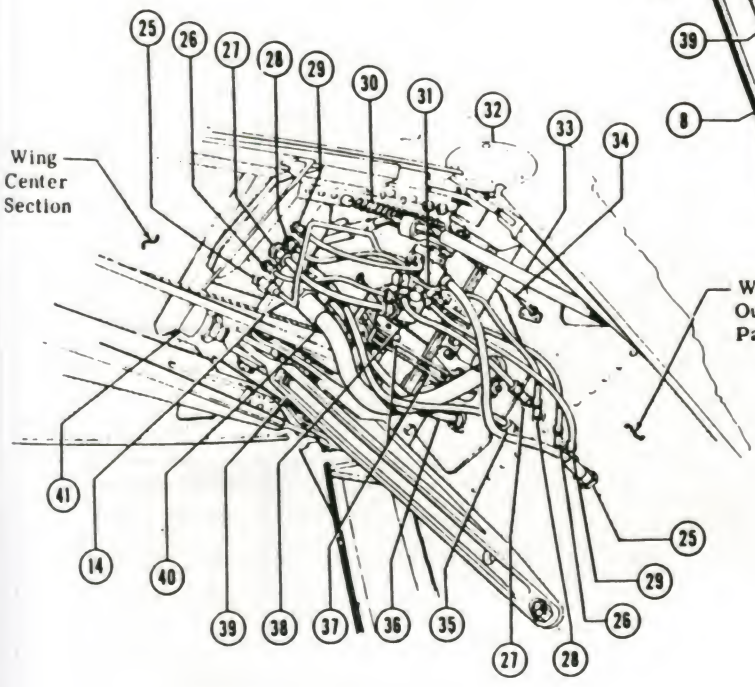


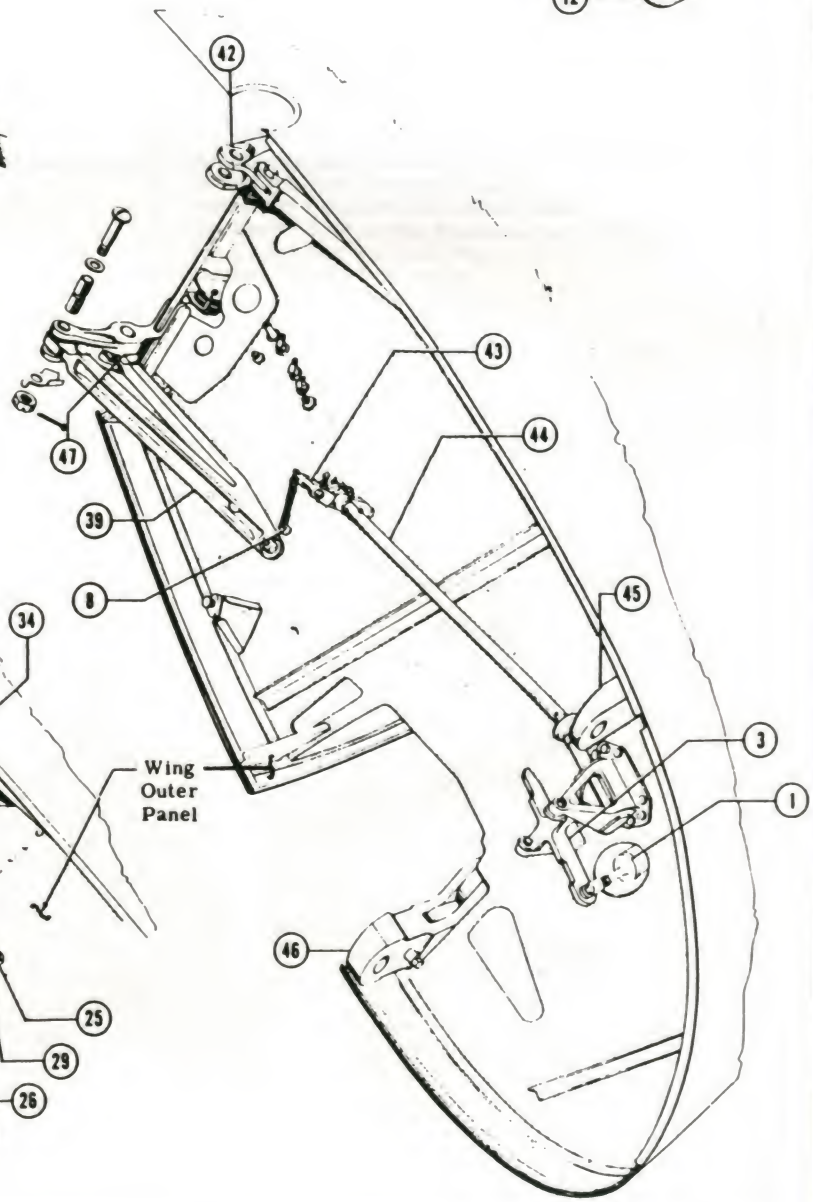
## *Wing Installation*



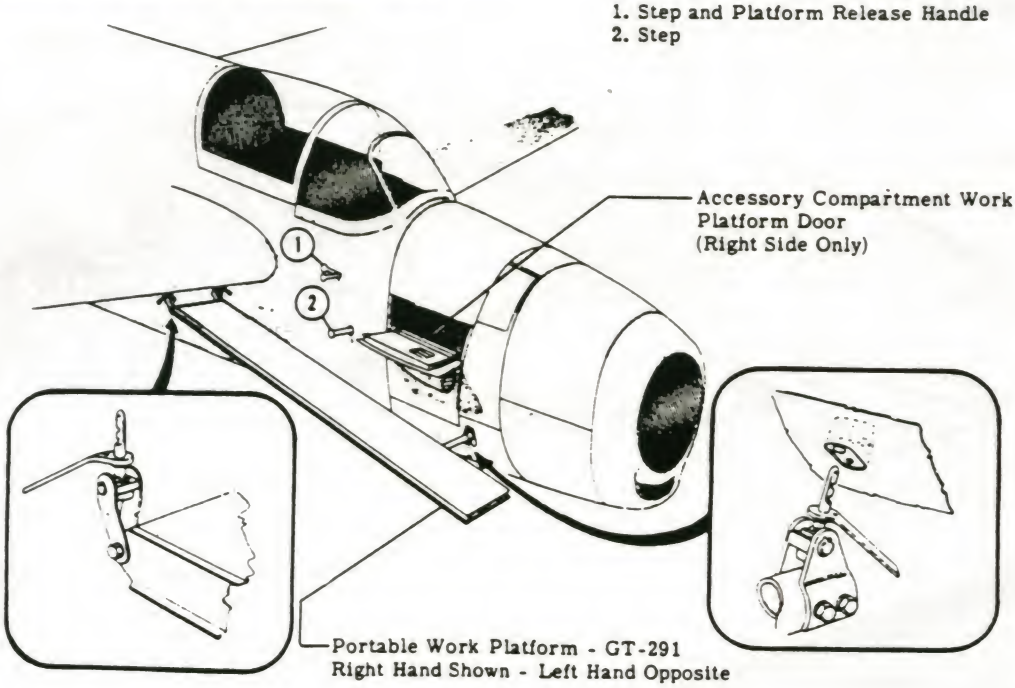



Left Wing Fold Joint
View Looking Forward

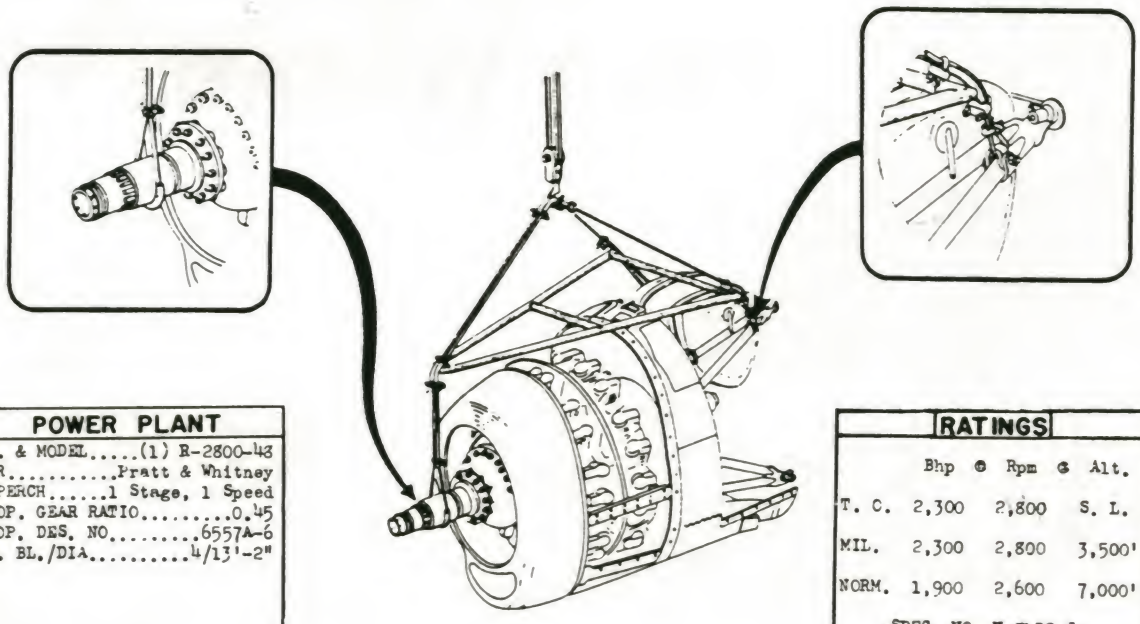


## GT-291 Platform Assembly Removable Work




## GT-287 Sling Assembly Quick Change Engine Unit

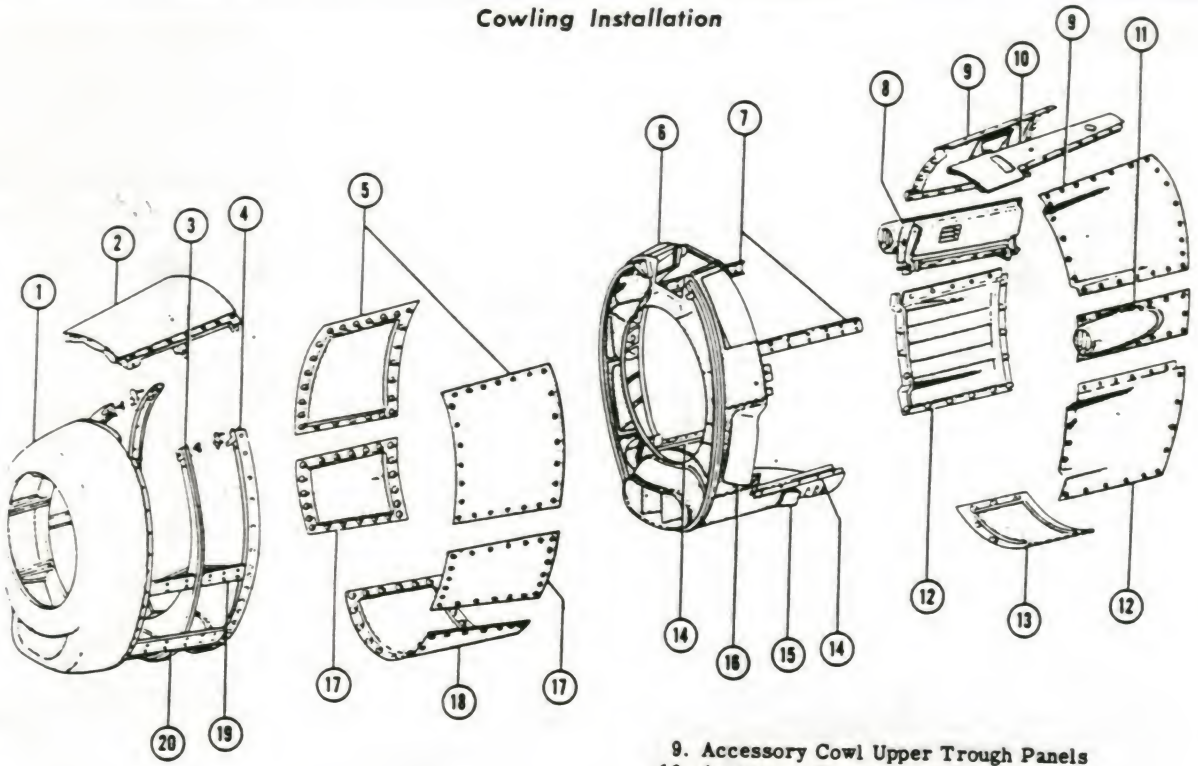


| POWER PLANT | |
|---|---|
| NO. & MODEL | (1) R-2800-43 |
| MFR | Pratt & Whitney |
| SUPERCH | 1 Stage, 1 Speed |
| PROP. GEAR RATIO | 0.45 |
| PROP. DES. NO. | 6557A-6 |
| NC. BL./DIA | 4/13'-2" |

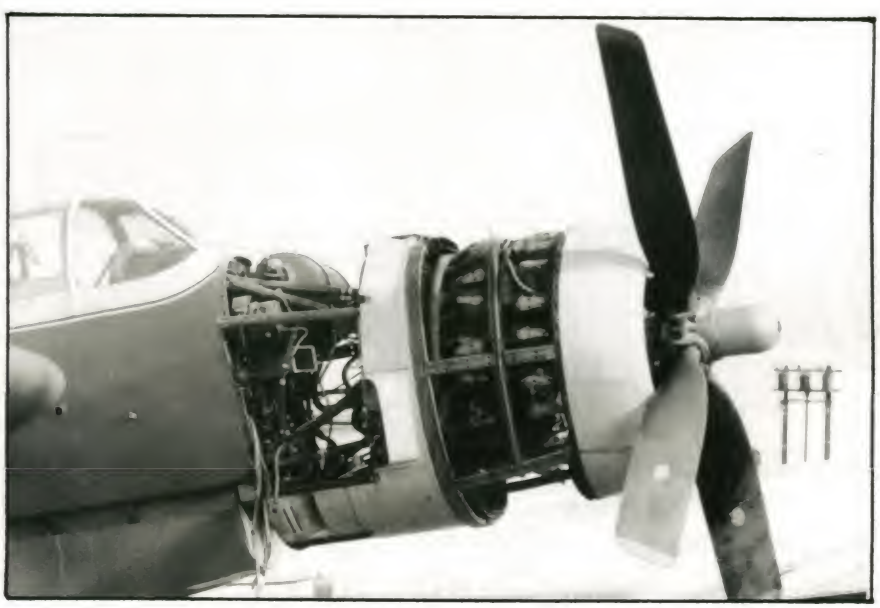
| RATINGS | Bhp @ | Rpm @ | Alt. |
|---|---|---|---|
| T. O. | 2,300 | 2,800 | S. L. |
| MIL. | 2,300 | 2,800 | 3,500' |
| NORM. | 1,900 | 2,600 | 7,000' |

SPEC. NO. N-8132-C

## *Cowling Installation*

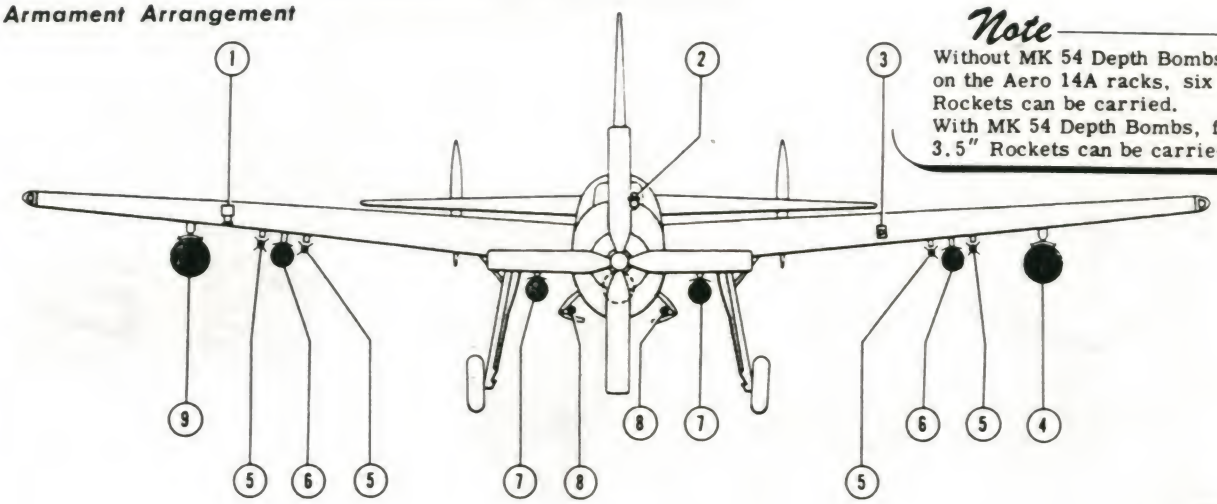



1. Ring Cowl Nose Spinning
2. Ring Cowl Top Panel
3. Ring Cowl Baffle Seal
4. Ring Cowl Panels Rear Support Ring
5. Ring Cowl Upper Side Panels
6. Engine Section Baffle
7. Accessory Cowl Upper Panels Support Channels
8. Accessory Compartment Work Platform
9. Accessory Cowl Upper Trough Panels
10. Accessory Compartment Top Panel
11. Accessory Cowl Left Side Panel
12. Accessory Cowl Exhaust Troughs
13. Accessory Compartment Access Door
14. Accessory Cowl Lower Panels Support Channels
15. Oil Cooler Exit Air Left Flap
16. Exhaust Trough Left Cover
17. Ring Cowl Lower Side Panels
18. Ring Cowl Bottom Panel
19. Ring Cowl Panels Upper Forward Left Channel
20. Ring Cowl Panels Lower Forward Left Channel



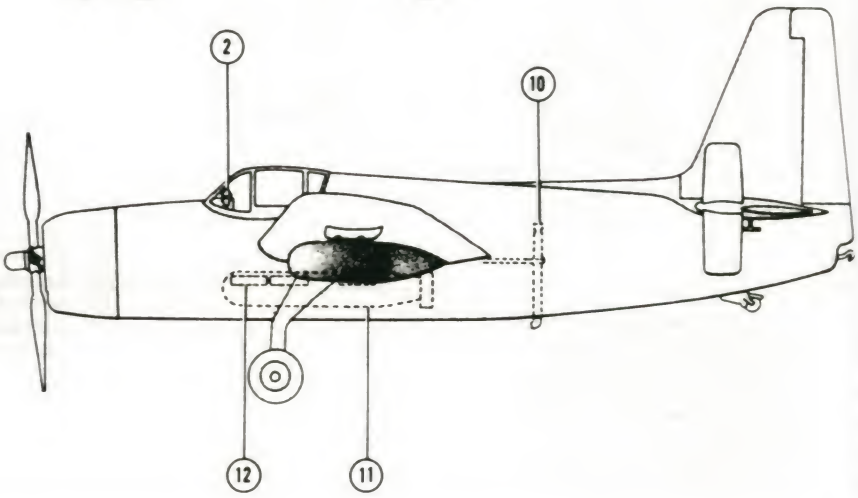
(Larkins)

### *Armament Arrangement*



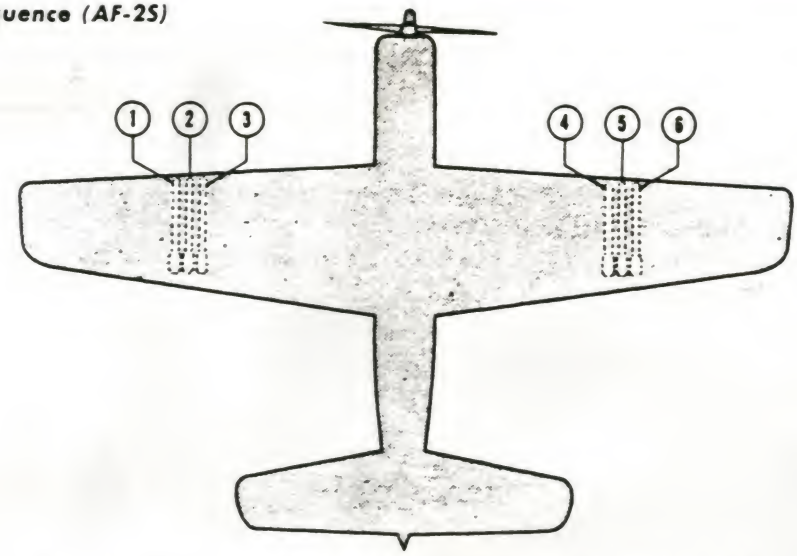

**Note**

Without MK 54 Depth Bombs on the Aero 14A racks, six 5" Rockets can be carried. With MK 54 Depth Bombs, four 3.5" Rockets can be carried.



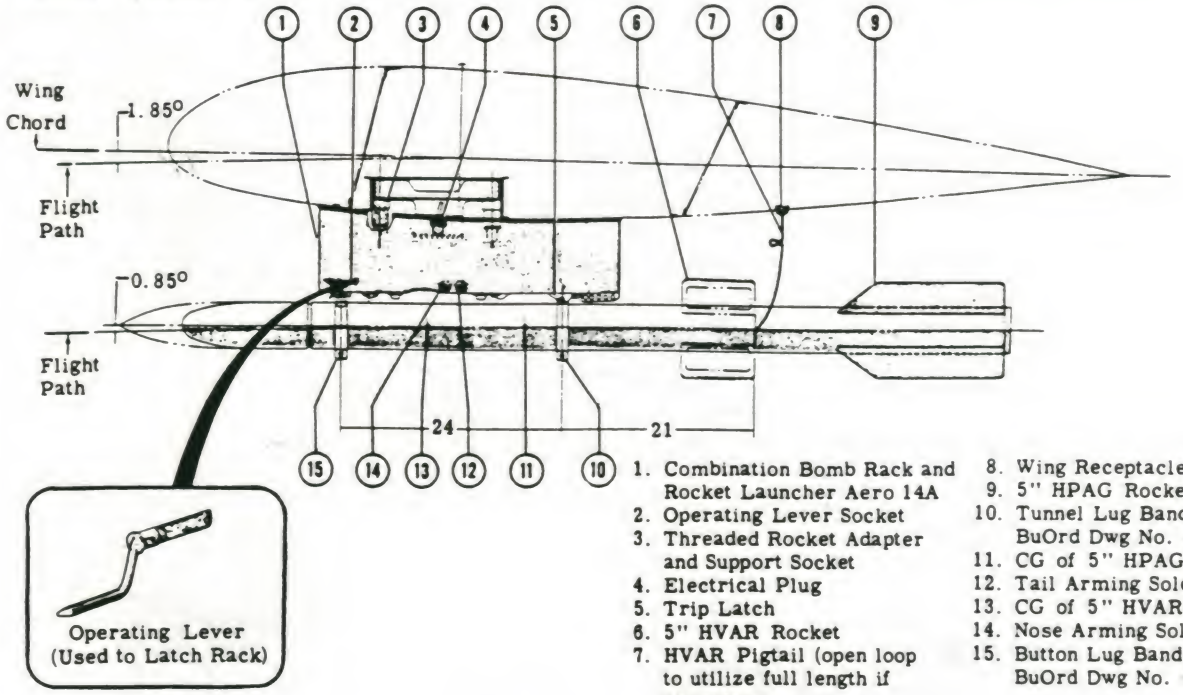

1. K-25A Camera
2. Rocket Sight
3. Gun Camera
4. Searchlight
5. Rocket
6. MK 54 Depth Bomb (Airplanes ser No. 126785 and subsequent) or Rocket
7. Fuel Tank or Aero 2A Sonobuoy Dispenser (Airplanes ser No. 126720 and subsequent) or MK 54 Depth Bomb (Airplanes ser No. 126785 and subsequent)
8. AN/SSQ-1 Sonobuoys
9. AN/APS-31A Radar Nacelle
10. Periscope and Bombsight
11. Torpedo or Mine
12. MK 6 Floatlight Racks

### *Rocket Firing Sequence (AF-2S)*




| Rocket Stations | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Single Firing Order | 1 | 5 | 3 | 6 | 2 | 4 |
| Pairs Firing Order | 1 | 2 | 3 | 3 | 2 | 1 |

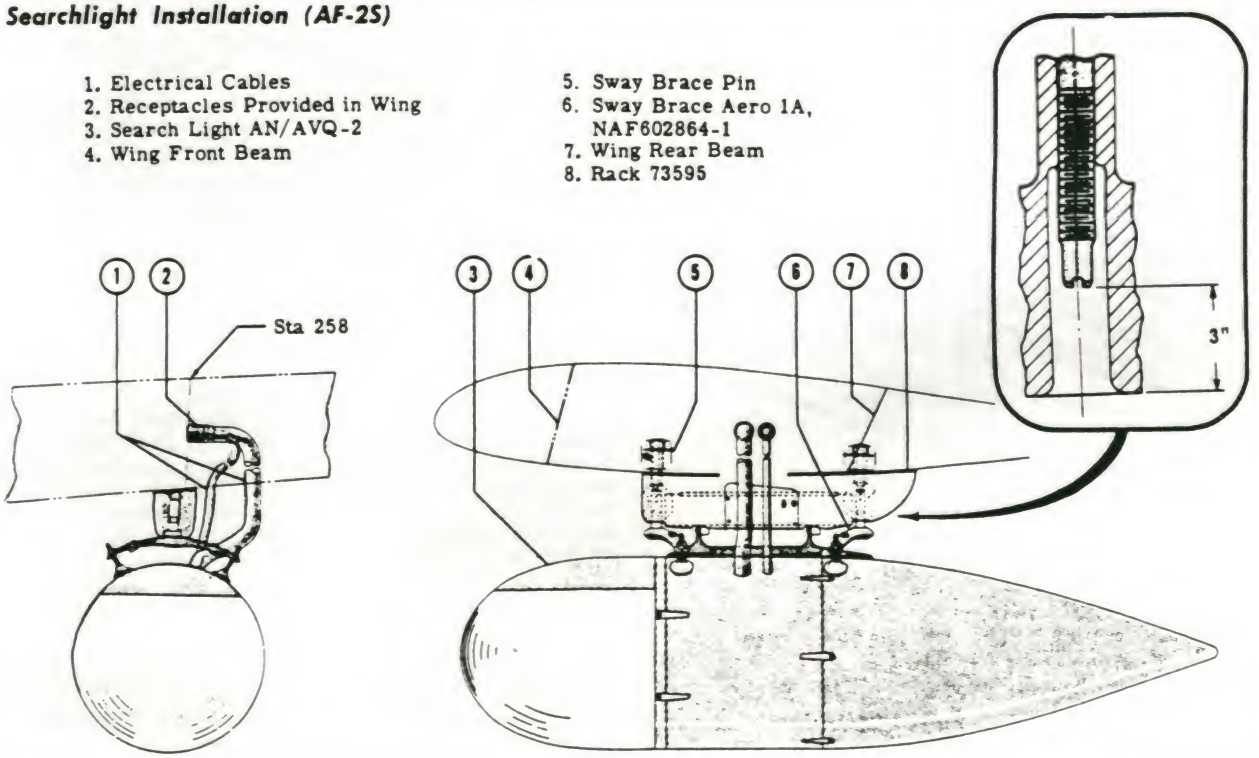
## *Loading Rockets (AF-2S)*

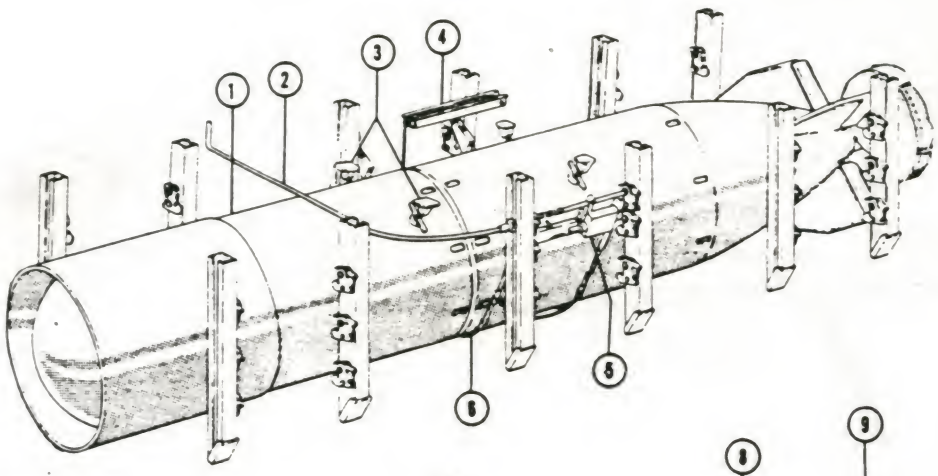



1. Combination Bomb Rack and Rocket Launcher Aero 14A
2. Operating Lever Socket
3. Threaded Rocket Adapter and Support Socket
4. Electrical Plug
5. Trip Latch
6. 5" HVAR Rocket
7. HVAR Pigtail (open loop to utilize full length if necessary
8. Wing Receptacle
9. 5" HPAG Rocket
10. Tunnel Lug Band BuOrd Dwg No. 467062
11. CG of 5" HPAG Rocket
12. Tail Arming Solenoid
13. CG of 5" HVAR Rocket
14. Nose Arming Solenoid
15. Button Lug Band BuOrd Dwg No. 467063

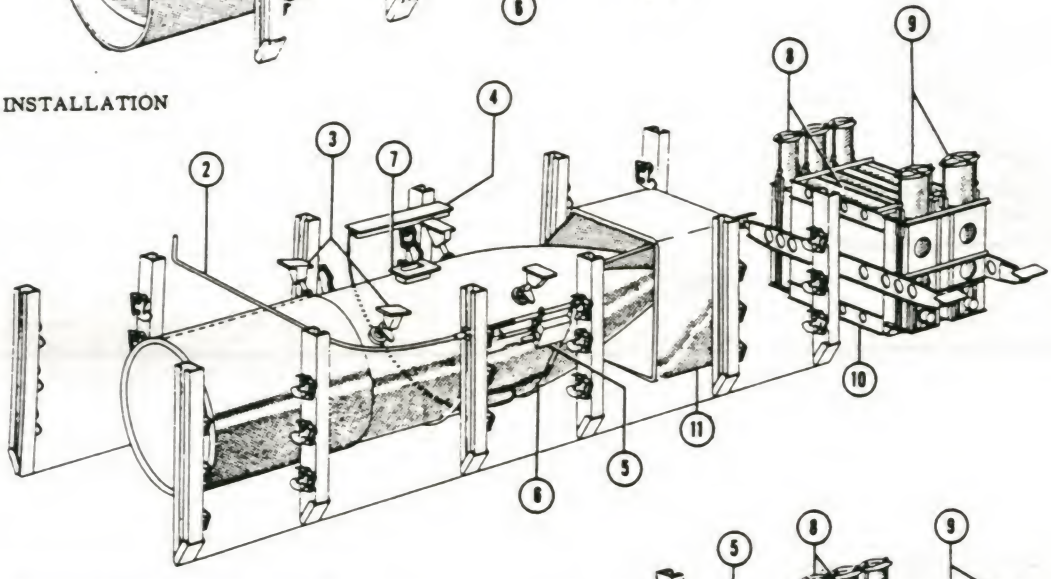
## *Searchlight Installation (AF-2S)*

1. Electrical Cables
2. Receptacles Provided in Wing
3. Search Light AN/AVQ-2
4. Wing Front Beam
5. Sway Brace Pin
6. Sway Brace Aero 1A, NAF602864-1
7. Wing Rear Beam
8. Rack 73595

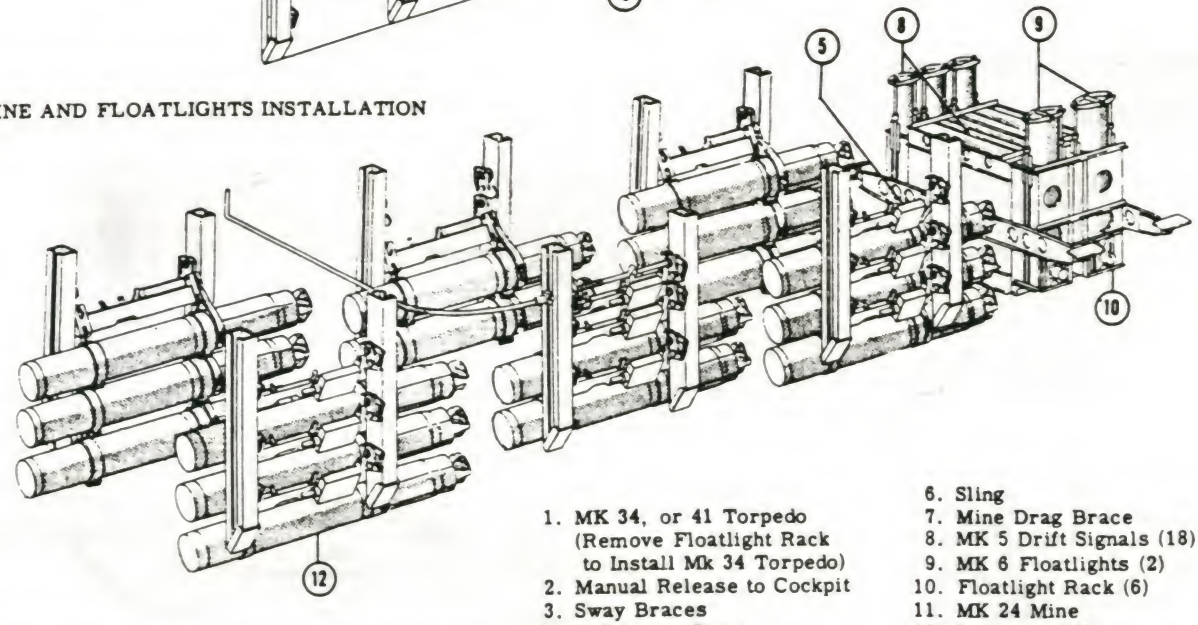





TORPEDO INSTALLATION



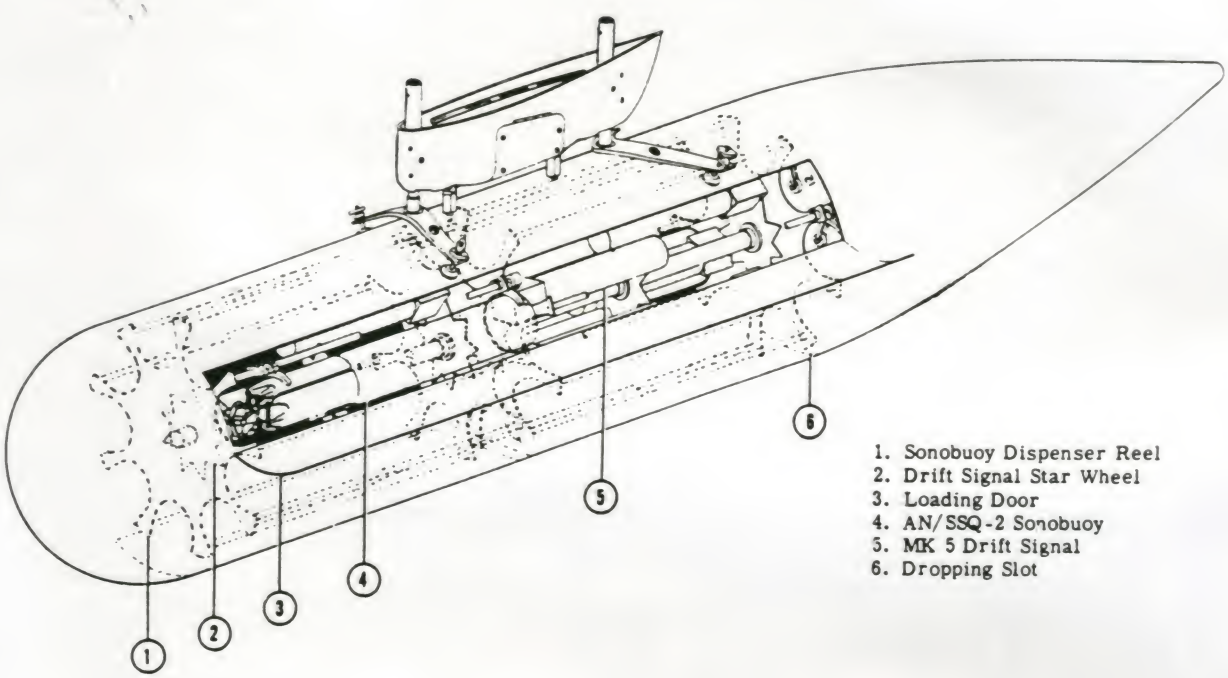

MINE AND FLOATLIGHTS INSTALLATION

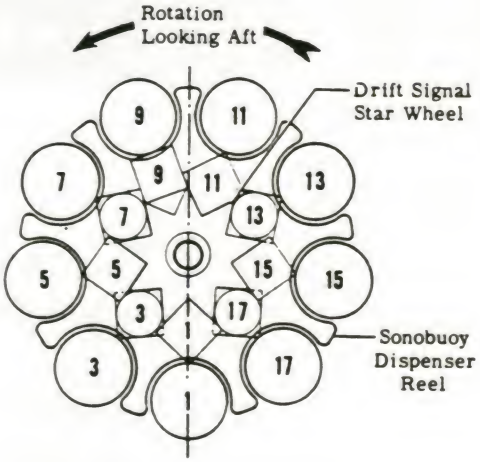



SONOBUOY AND FLOATLIGHTS INSTALLATION

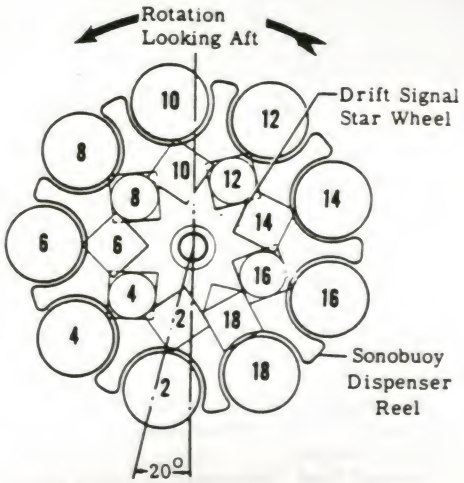
1. MK 34, or 41 Torpedo (Remove Floatlight Rack to Install Mk 34 Torpedo)
2. Manual Release to Cockpit
3. Sway Braces
4. Retrieving Bungee
5. MK 8 Type Shackle
6. Sling
7. Mine Drag Brace
8. MK 5 Drift Signals (18)
9. MK 6 Floatlights (2)
10. Floatlight Rack (6)
11. MK 24 Mine
12. Sonobuoy (16) AN/SSQ-2

*Figure 4–95. Bomb Bay Arrangement (AF-2S) Airplanes Ser No. 123088 through 124848*



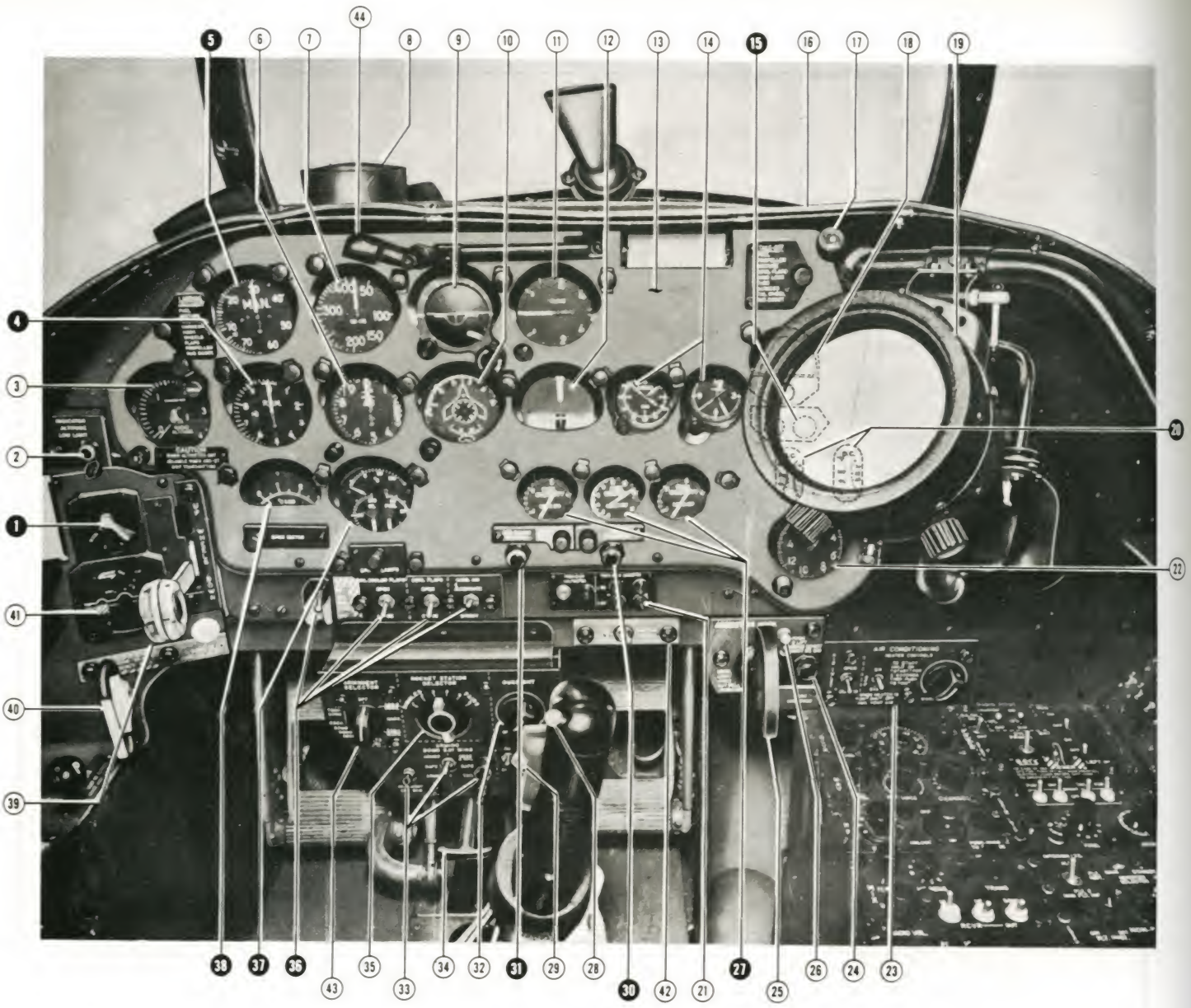




Release sequence diagram, forward section. Number "1" sonobuoy and drift signal are in position for release.



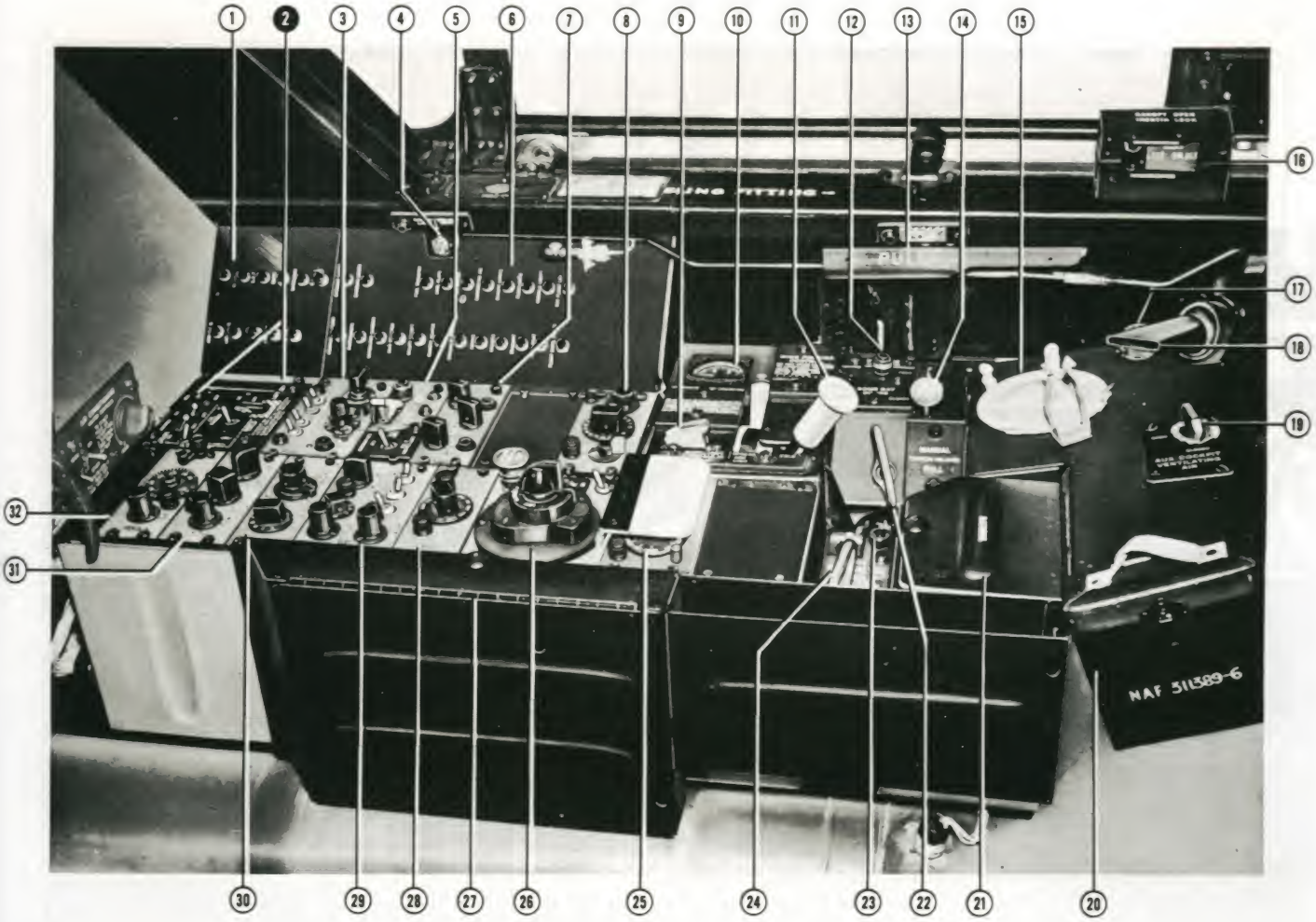

Release sequence diagram, aft section. Number "2" sonobuoy and drift signal are 20° from release position.

*Figure 5—4A. Sonobuoy Loading and Release Sequence Diagram (AF-2S)*



***Pilot's Cockpit—Forward***

1. Ignition Switch.
2. Radio Altimeter Low Limit Indicator.
3. Radio Altimeter.
4. Tachometer Indicator.
5. Manifold Pressure Gage.
6. Altimeter.
7. Airspeed Indicator.
8. Rocket Sight.
9. Gyro Horizon Indicator.
10. Directional Gyro (Master Direction) Indicator.
11. Climb Indicator.
12. Turn and Bank Indicator.
13. Location of Radio Altimeter Altitude Limit Switch—Airplanes ser No. 123088 through 124848.
14. Clock and Elapsed Time Clock—Airplanes ser No. 126720 and subsequent; Elapsed Time Clock only on airplanes ser No. 123088 through 124848.
15. Generator Warning Lights (2)—Airplanes ser No. 123088 through 126784, or Generator Warning Light (1)—Airplanes ser No. 126785 and subsequent.
16. Pilot Directional Indicator (PDI)—retracted position.
17. PDI Raising Control.
18. Outside Air Temperature Indicator.
19. ID-162A/APS-31 Radar Repeat Indicator.
20. Voltammeters (2).
21. Precision Voltmeter and Ammeter Pin Jacks.
22. Accelerometer.
23. Air Conditioning Control Panel
    Left to Right—Air Inlet Control Switch, Heater Start Switch and Temperature Control Rheostat.
24. Arresting Hook Warning Light.
25. Arresting Hook Control.
26. Arresting Hook Raising Switch.
27. Fuel Quantity Indicators. Left to Right - Left Wing Tank, Main Tank, and Right Wing Tank.
28. "B" Button.
29. "RP" Button.
30. Fuel Transfer System Warning Light.
31. Fuel Low Level Warning Light.
32. Gunsight Control Panel.
    Top - Rheostat, Bottom - Lamp Switch.
33. Armament Switches (see figure 4-1).
34. Rudder Pedal Adjustment Handle.
35. Rocket Station Selector.
36. Power Plant Switches.
    Left to Right - Auxiliary Fuel Pump, Oil Cooler Flap, Cowl Flap, and Carburetor Air Switches.
37. Engine Gage Unit.
38. Cylinder Head Temperature Indicator.
39. Landing Gear Selector Control.
40. Landing Gear Emergency Control.
41. Wheels and Flaps Position Indicator.
42. G-2 Compass Switch—Airplanes ser No. 126720 and subsequent.
43. Armament Selector Switch—Airplanes ser No. 126720 and subsequent (see figure 4-1).
44. Emergency Instrument Light—Airplanes ser No. 126785 and subsequent.

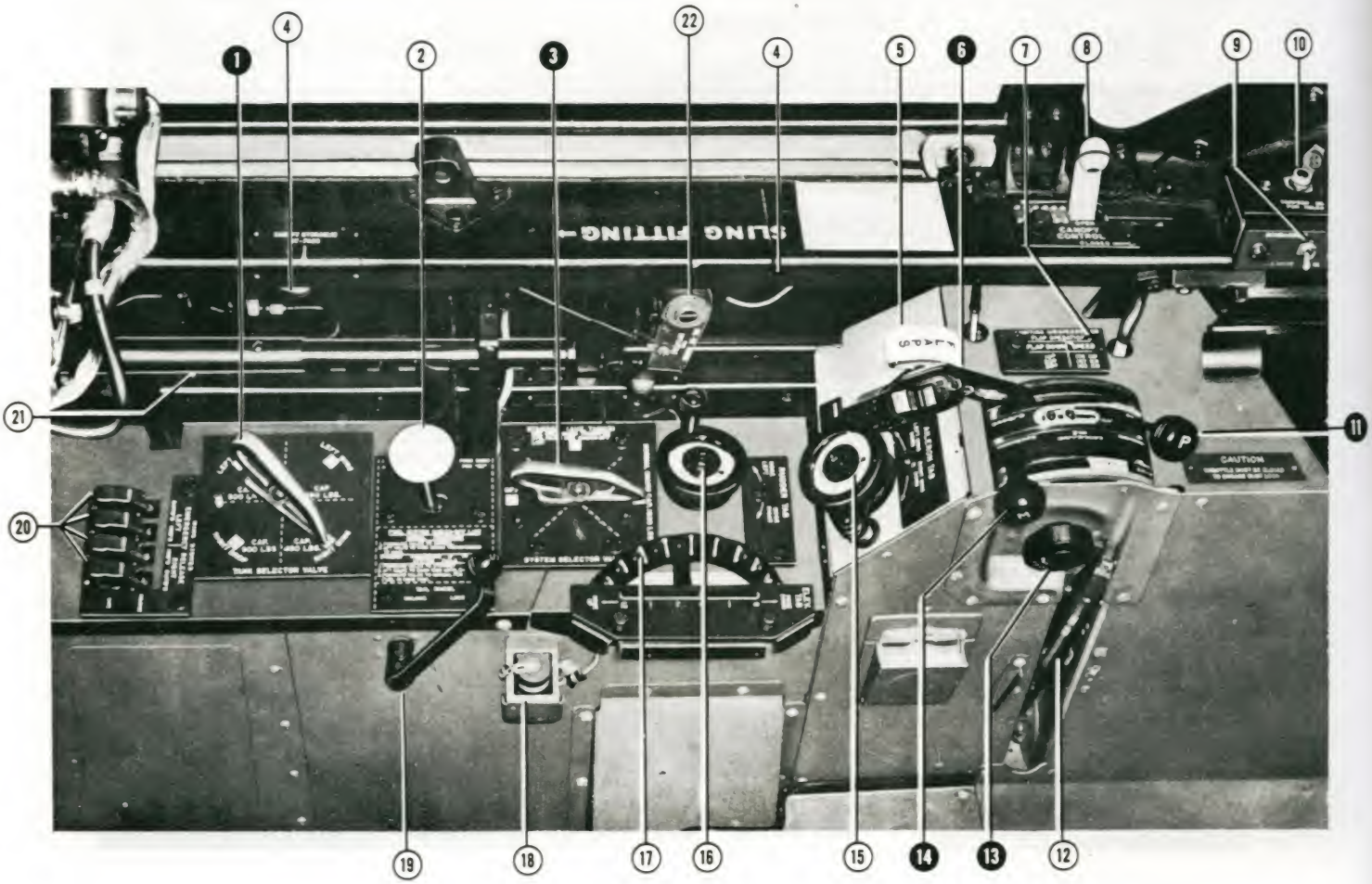



*Pilot's Cockpit—Right Side, Airplanes Ser No. 126720 and Subsequent*

NOTE

Controls are edge lighted on airplanes ser No. 126785 and subsequent.

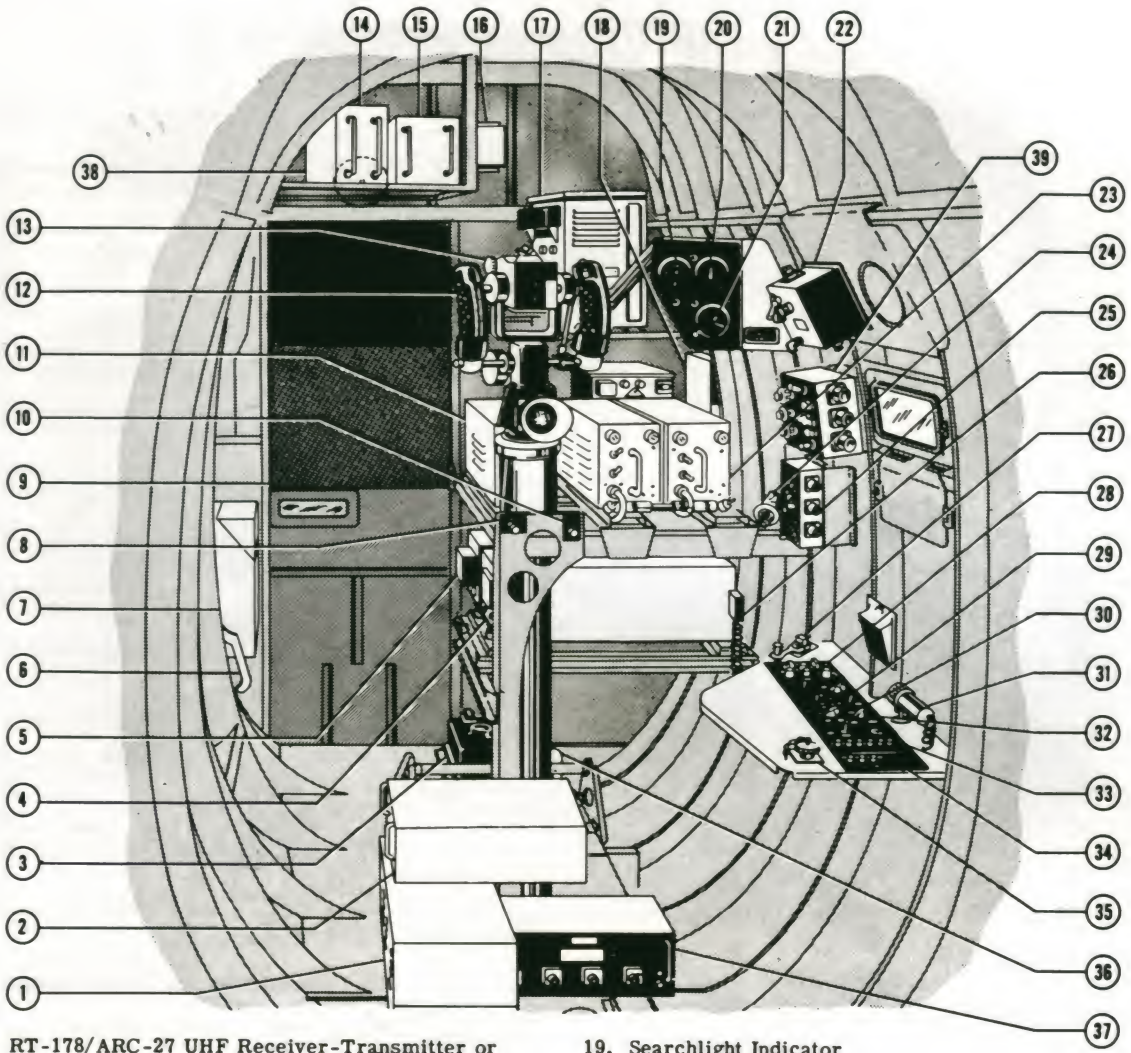
1. Radio Circuit Breaker Panel
2. Power Console Panel
   Front Row—Oil Dilution, Radio Master, Pitot Heat and Right Generator Switches
   Rear Row—Starter, Primer, Battery and Left Generator Switches
3. Exterior Lights Control Panel
4. Circuit Breaker Light Switch—Airplanes ser No. 126785 and subsequent
5. Interior Lights Control Switch, Inverter Selector Switch, Interior Lights Rheostat (airplanes ser No. 126720 through 126784) and Stand-by Inverter Indicator Light (airplanes ser No. 126720 through 126817) or Instrument Power Failure Indicator Light (airplanes ser No. 126818 and subsequent)
6. Electrical Circuit Breaker Panel
7. Interior Lights Control Panel—Airplanes ser No. 126785 and subsequent
8. UHF Control Panel—C-628/ARC-27—Airplanes ser No. 126760 and subsequent.
9. Auxiliary Hydraulic Pump Switch
10. Hydraulic Pump Pressure Gage
11. Wing Folding Control
12. Bomb Bay Door Warning Light
13. Automatic Pilot Emergency Disconnect Control
14. Bomb Bay Doors Control
15. Signal Light Stowage Clips
16. Canopy Open Inertia Lock
17. Signal Light Receptacle
18. Auxiliary Cockpit Ventilating Air Face Outlet
19. Auxiliary Cockpit Ventilating Air Control
20. Signal Light Filter Case
21. Food Rations Container
22. Manual Torpedo Release Control
23. Bomb Bay Low Temperature Warning Light
24. Bomb Bay Temperature Control
25. IFF Control Panel—C-629/APX-6
26. Automatic Pilot Control Panel
27. Chart Case
28. Radio Altitude Limit Control Panel—C-734/APN-1
29. ICS Mixer Control Panel—C-737/AIC-4A
30. HF Transmitter-Receiver Control Panel—C-732/ARC-2
31. Navigation Receiver Control Panel—C-738/ARR-2A
32. Range Receiver Control Panel—C-744/ARC-5




*Pilot's Cockpit—Left Side*

THE ONLY DIFFERENCE BETWEEN THE AF-2S AND THE AF-2W IS THAT THE -2W ONLY HAS TWO SWITCHES ON #20

1. Fuel Tank Selector Valve Control
2. Rudder Boost and Flaperon Control
3. Fuel System Selector Valve Control
4. Canopy Hydraulic By-pass Control—Forward Location on airplanes ser No. 123088 through 124188; aft location on airplanes ser No. 124190 and subsequent
5. Wing Flap Control
6. Throttle Lever and ICS-RAD Switch
7. Location of Sonobuoy Release Switch—Airplanes ser No. 123088 through 124848
8. Canopy Control and Emergency Release
9. Bombardier Override Switch
10. Torpedo Ready for Release Indicator Light
11. Propeller RPM Control Lever
12. Gust Lock Lever
13. Controls Quadrant Friction Adjustment
14. Mixture Control Lever
15. Aileron Trim Tab Control
16. Rudder Trim Tab Control
17. Elevator Trim Tab Control
18. Utility Receptacle
19. Tail Wheel Lock Control
20. Drop Tank Release Switches (2)—Airplanes ser No. 123088 through 126784, or Wing Stores Emergency Release Switches (4)—Airplanes ser No. 126785 and subsequent
21. Auxiliary Cockpit Ventilating Air Outlet Tube
22. Bail-out Warning Bell Handle—Airplanes ser No. 124190 and subsequent

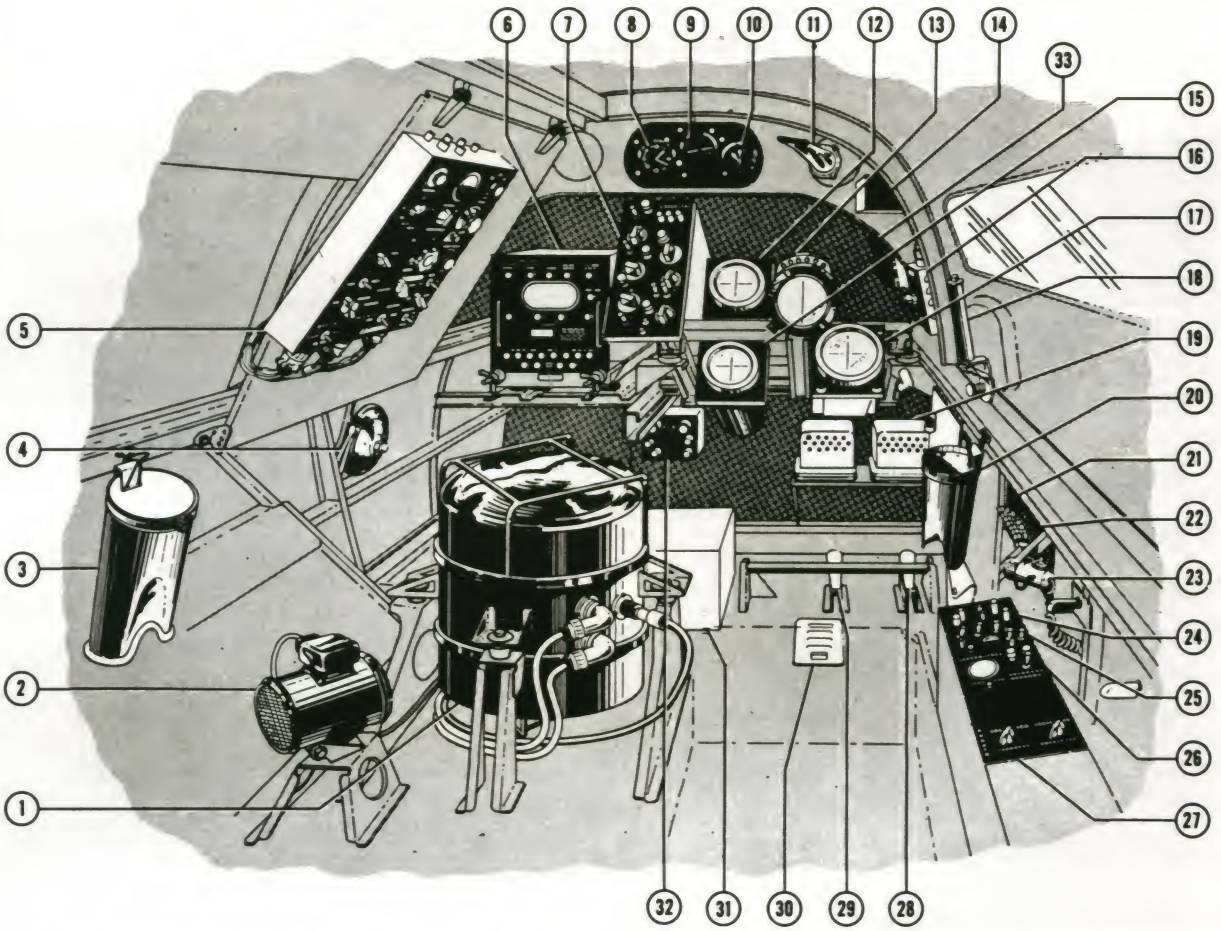


1. RT-178/ARC-27 UHF Receiver-Transmitter or RT-18A/ARC-1 VHF Receiver-Transmitter
2. ( )/ARR-26 Sonobuoy Receiver System Sweep Generator
3. CN-51/APS-31 Search Radar Gyroscope Unit
4. KY-42/ARR-27 Radar Relay Receiver Video Decoder
5. R-267/ARR-27 Radar Relay Receiver
6. Door Emergency Jettison Lever
7. First Aid Kit
8. Bomb Bay Door-Open Indicator Light
9. Passageway to Second Compartment
10. Torpedo Ready-for-Release Indicator Light
11. PP-389/ARR-27 Radar Relay Receiver Power Supply
12. MK 41 Mod 3 Periscope
13. MK 23 Mod 6 Bomb Sight
14. Searchlight Amplifier
15. PP-468/ARR-26 Sohobuoy Receiver Power Supply
16. F-65A Antenna Filter
17. RT-82/APX-6 IFF Transmitter-Receiver
18. Radio Terminal Panel
19. Searchlight Indicator
20. Airspeed Indicator
21. Altimeter
22. MK 10 Mod 0 Bomb Sight Control Box
23. R-316/ARR-26 Sonobuoy Receiver
24. Heating and Ventilating System Face Nozzle
25. K-25A Camera Timer Control Box
26. CX-1301/AR Microphone Cord Assembly
27. Telegraph Key
28. C-736/AIC-4A ICS Control Panel
29. Camera and Flasher Control Panel
30. Searchlight Switch Panel
31. Utility Light
32. Interior Lights Control Panel
33. HF Emission Selector Switch and A-C Utility Receptacle Panel
34. Electric Circuit Breaker Panels
35. D-C Utility Receptacle
36. Microphone Foot Switch
37. RT-7/APN-1 Radio Altimeter Transmitter-Receiver
38. Bail-out Warning Bell-Airplanes ser No. 126807 and subsequent
39. C-626/ARC-27 Remote Control

***Note***

Location of items 33 and 34 is reversed on airplanes ser No. 126720 through 126724.

**AF-2S** ***Aft Compartment—Forward, Airplanes Ser No. 126720 and Subsequent***

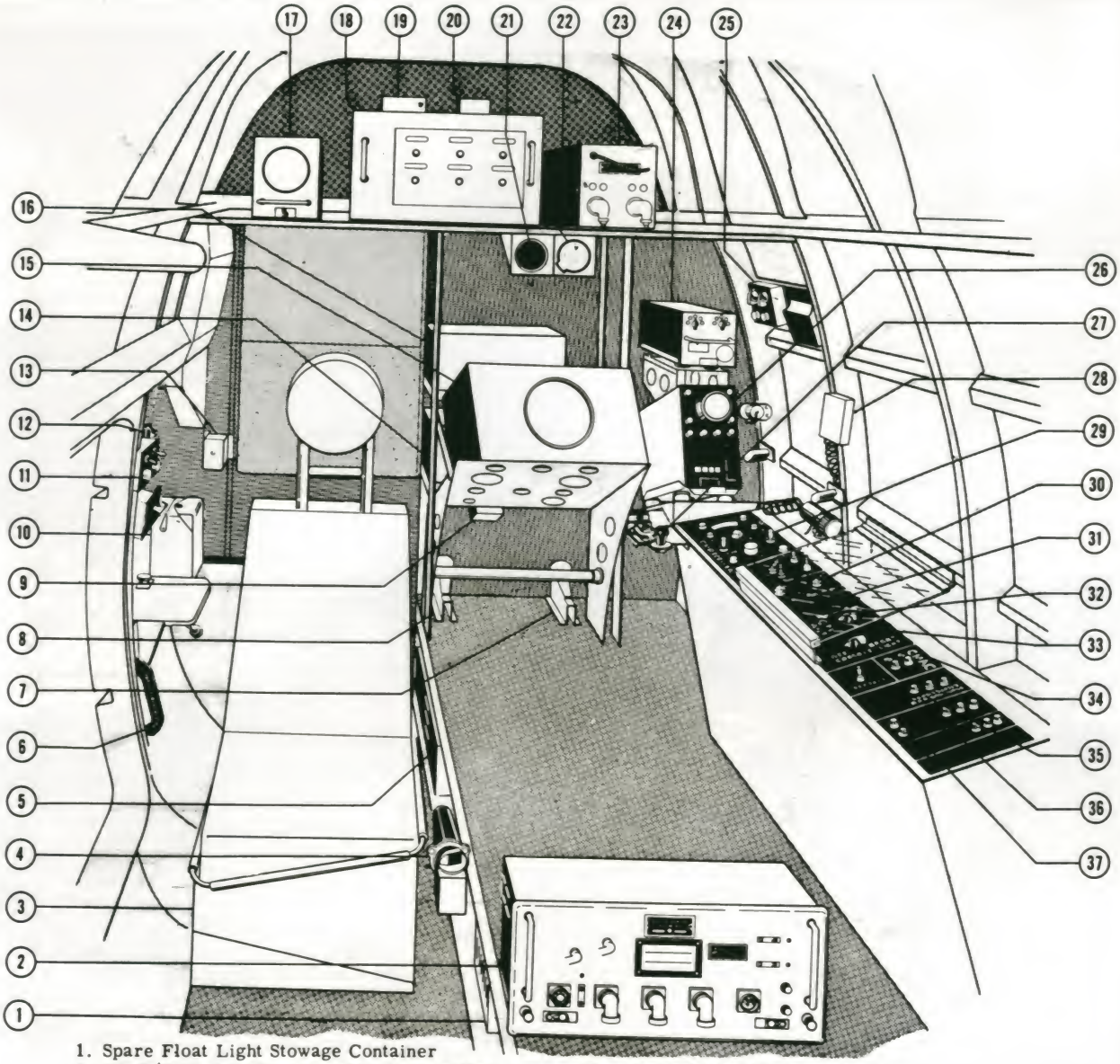


1. MD-60A/APS-31 Search Radar Modulator
2. HD-15/U Blower Unit
3. MX-511/APS-31 Visor
4. Bail-out Warning Bell--Airplanes ser No. 126720 through 126806
5. C-729/APS-31A Search Radar Control Box
6. SN-36A/APS-31 Search Radar Synchronizer
7. C-610/ARR-26 Sonobuoy Receiver Control Unit
8. Altimeter
9. Compass Repeat Indicator
10. Elapsed Time Clock
11. Heating and Ventilating System Face Nozzle
12. ( )/ARR-26 Sonobuoy Receiver System Azimuth Indicator
13. ID-162A/APS-31 Search Radar Indicator
14. J-437/ARR-27 Radar Relay Receiver Fuse Box
15. ( )/ARR-26 Sonobuoy Receiver System Azimuth Indicator
16. TF-106A/APS-31 Search Radar Variable Autotransformer
17. IP-41/ARR-27 Radar Receiver Range Azimuth Indicator
18. Hatch Locking Lever
19. D-C Voltage Regulators
20. MX-927/ARR-27 Visor
21. Radar Relay Receiver, Sonobuoy Receiver and Utility Receptacle Circuit Breaker Panel
22. Main Inverter Switch Breaker and D-C Circuit Breaker Panel
23. Utility Light
24. C-736/AIC-4A Radio-ICS Control Panel
25. C-750/ARR-27A Radar Relay Receiver Control Panel
26. Sonobuoy Control Panel
27. Instrument and Console Lights Control Panel
28. Microphone Foot Switch
29. Record Foot Switch
30. Heating and Ventilating System Floor Register
31. Type D-1 Power Unit (Type F2A-1a Flasher)
32. AN/APS-31A Search Radar Relay Box
33. AN/APS-31 Radar Terminal Panel

***Note***

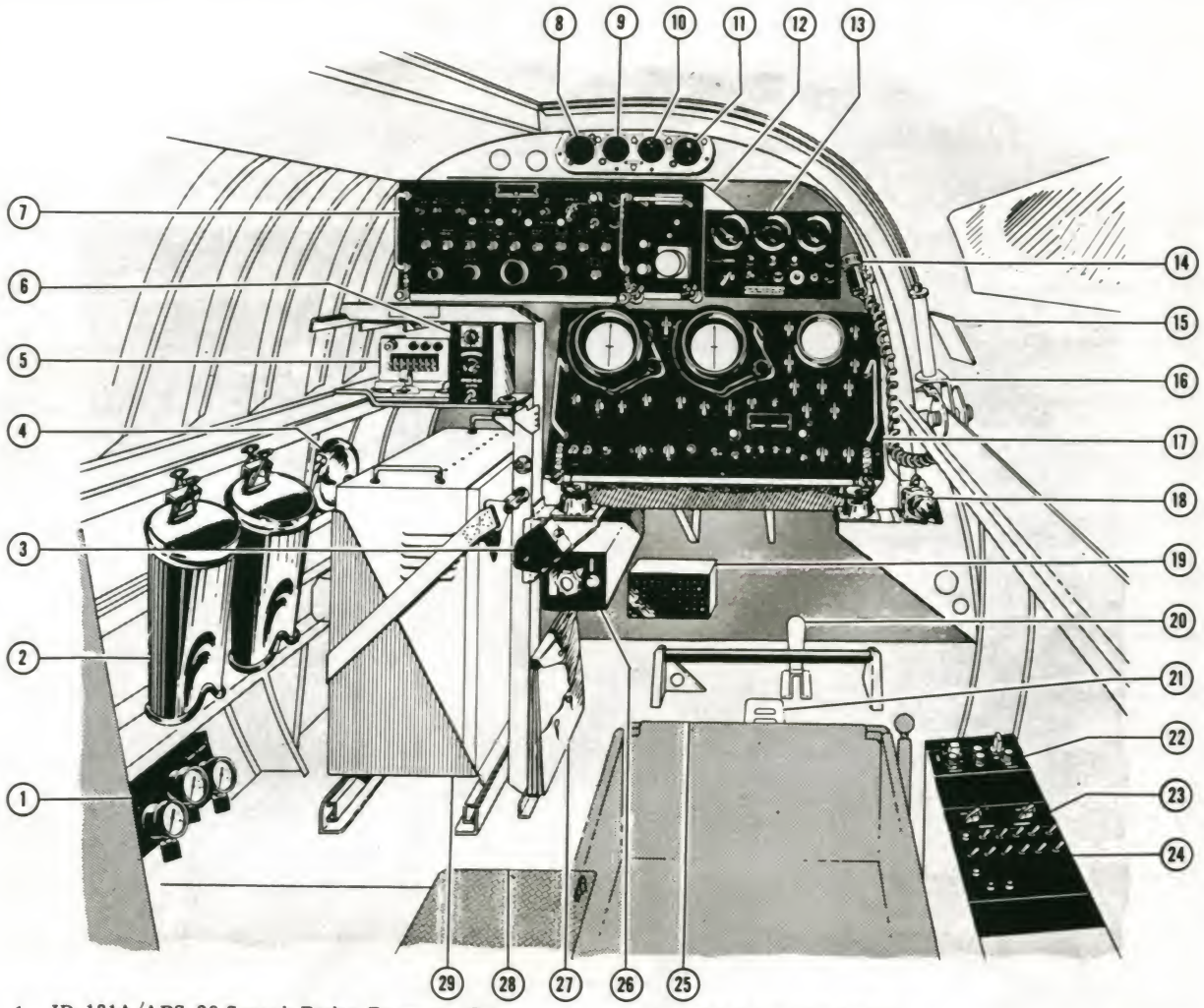
The CX-1301/AR microphone and cord assembly, 13A-3-J or IC/VRW-7 wire recorder, and SA-3/A IFF impact switch, not shown in this illustration, are mounted on the compartment aft bulkhead.

AF-2S ***Second Compartment—Forward, Airplanes Ser No. 126720 and Subsequent***



1. Spare Float Light Stowage Container
2. RT-7/APN-1 Radio Altimeter Transmitter-Receiver
3. Relief Operator's Seat
4. Heating and Ventilating System Face Nozzle
5. RT-18A/ARC-1 VHF Transmitter-Receiver
6. Door Emergency Jettison Lever
7. Radio - ICS Microphone Foot Switch
8. Record Foot Switch
9. J-268/APA-70 Terminal Box
10. First Aid Kit
11. C-173/AIC-4 Radio - ICS Control Box
12. Relief Operator's Microphone Switch
13. CX-922/AR Microphone Cord Assembly
14. SA-148A/APA-70 Switching Unit
15. IP-67/APS-20B Range Azimuth Indicator
16. CV-43/APR-9 Mixer Amplifier
17. CP-32/APA-57 Computer Indicator
18. C-441/APA-57 Navigation Control Unit
19. G-2 Compass Amplifier
20. F-65/A Antenna Filter
21. ID-24/ARN-9 Approach Indicator
22. G-2 Compass Master Direction Indicator
23. RF-38/APA-64B Pulse Analyzer
24. SA-265/APA-57 Inertia Cut-out Switch
25. C-174/AIC-4 Radio - ICS Control Box
26. ID-226/APR-9 Countermeasure Receiver Indicator
27. Telegraph Key
28. CX-922/AR Microphone Cord Assembly
29. C-654/APR-9B Countermeasure Receiver Control Panel
30. C-631/APA-70A Approach Indicator System Control Panel
31. Countermeasure Antenna Selector Switch Panel
32. Console Lights Control Rheostat Panel
33. HF Emission Control Switch and A-C Utility Receptacle Panel
34. Ground Position Indicator Circuit Breaker Panel
35. Countermeasure Equipment A-C Circuit Breaker and Fuse Panel
36. Countermeasure Equipment D-C Circuit Breaker Panel
37. Utility Receptacle and Compartment Lights Circuit Breaker Panel

AF-2W *Aft Compartment—Forward, Airplanes Ser No. 124779 through 124849*



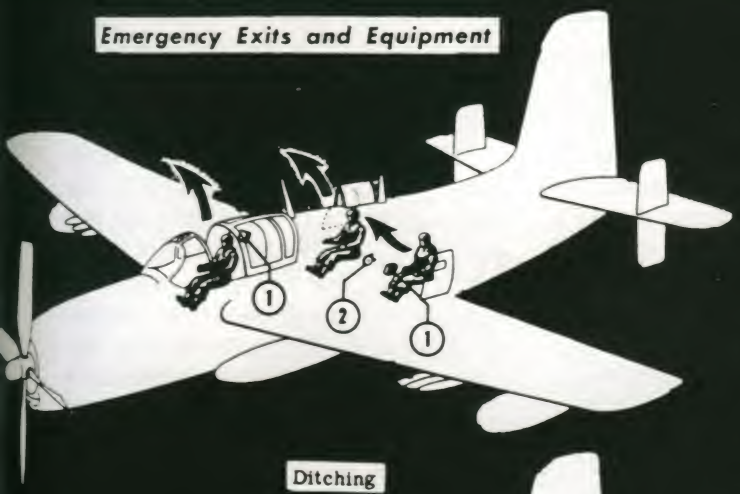

1. ID-131A/APS-20 Search Radar Pressure Gage Panel
2. Visors for Control Indicator PPI Screens
3. AN/APS-20C Search Radar Antenna Speed Control Box
4. Bail-out Warning Bell--Airplanes ser No. 126738 through 129265
5. A-C Voltage Regulator
6. C-804/APS-20A Search Radar Antenna Sector Scanning Control Box
7. SN-75/APS-20C Search Radar Synchronizer
8. Elapsed Time Clock
9. Compass Indicator
10. Airspeed Indicator
11. Altimeter
12. TN-129B/APR-9 Countermeasure Receiver RF Tuner
13. C-295/APS-20A Search Radar Control Meter Box
14. Utility Light
15. Rear View Mirror
16. Hatch Locking Lever
17. C-294A/APS-20A Search Radar Control Indicator
18. Heating and Ventilating System Face Nozzle
19. A-C Exciter Control
20. Microphone Foot Switch
21. Heating and Ventilating System Floor Register
22. C-736/AIC-4A Radio - ICS Control Box
23. Interior Lights Control Panel
24. AN/APS-20C Search Radar Power Distribution Control Panel
25. Radar Operator's Seat
26. TF-107/APS-20 Search Radar Variable Autotransformer
27. Map Case
28. Cover for Access to AN/APS-20C Search Radar Receiver and Transmitter
29. TD-9/APS-20A Search Radar Rectifier Timing Central

***Note***

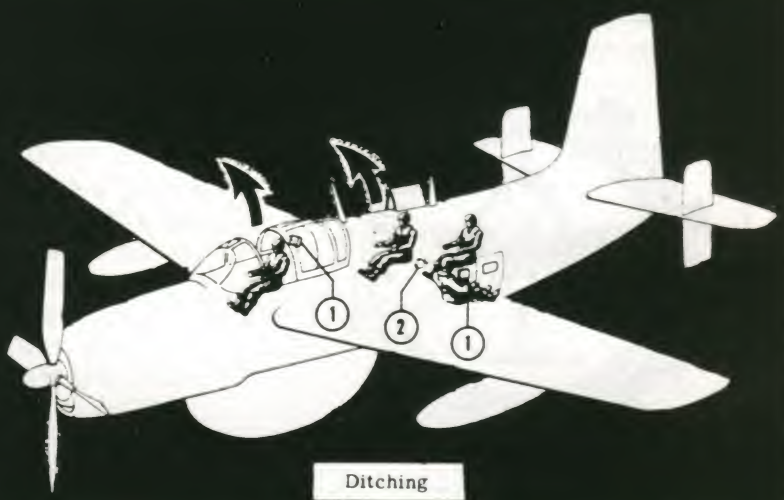
The SA-3/A IFF impact switch and CX-1301/AR microphone cord assembly, not shown in this illustration, are mounted on the aft bulkhead of this compartment. A countermeasure antenna system transco changeover switch and a commutator assembly, not shown, are located just forward of item 13.

**AF-2W** ***Second Compartment—Forward, Airplanes Ser No. 126738 and Subsequent***

## *Emergency Exits and Equipment*




Ditching




Ditching

Bail Out

Bail Out

1. First Aid Kit
2. Bail Out Warning Bell (Ser No. 124191 and Subs)

Pilot's and crew's seats are designed to accommodate seat type parachutes, pararaft kits, back pans and seat pans.

Forced Landing

Forced Landing

# NAVAL AIR TEST CENTER (NATC), PATUXENT RIVER, MARYLAND

**AF-2S assigned to the flight test division (FT) is launched from the deck of the USS Valley Forge (CV/CVS-45). (USN via Joel Griggs) AF-2W 123099 was delivered to NATC on 4-30-50 and was originally assigned to the Tactical Test Division (TT). Below it appears in the markings of the Electronic Test Division (ET) which it wore from 8-50 until 11-51. The prop dome is red with a white spiral. ( via R. F. Besecker)**

The Naval Air Test Center (NATC) at NAS Patuxent River, Maryland, is the Navy's primary aeronautical testing facility. NATC is responsible for evaluating a new aircraft's suitability for use with the fleet. During the AF's career there were five test divisions which evaluated it's potential. These were: Flight Test (FT); Tactical Test (TT); Service Test (ST); Electronics Test (ET); and Armament Test (AT).

Seven AF-2W (123089, 091, 093, 095, 097, 099, 101) and seven AF-2S (123088, 090, 092, 094, 096, 098, 100) airplanes were employed in trials at NATC, Naval Aircraft Torpedo Unit, and VX-1. These trials extended from May 1950 to November 1951. Carrier qualifications were conducted on board the USS Wright in November 1950, the USS Palau in December 1950 and in June 1951, and the USS Montery in August 1951. Car-quals were interrupted and delayed by repeated modifications of the tail wheel and supporting fuselage structure.

The preliminary tests of the sonobuoy installation showed that the equipment would be inadequate and unsatisfactory. It was therefore decided to use the Douglas externally carried sonobuoy dispenser on production aircraft. Tests of this dispenser were generally satisfactory and it was recommended that the Aero 2A sonobuoy dispenser be accepted as the standard sonobuoy installation in the AF-2S.

As a result of unsatisfactory performance of the Aero 12A rocket launcher, which was originally specified for the AF-2S, the Aero 14A combination bomb rack and rocket launcher was tested with satisfactory results, and it was concluded that the Aero 14A installation should be used on the AF-2S.

NATC AF-2W assigned to Flight Test during carrier suitability tests. Aircraft has a large white "X" on the forward fuselage for photographic reference. (via Joel Griggs)


Two views of AF-2S 123098 on 11-3-50 while assigned to the Flight Test Division (FT). Note the locations of the wing codes, 098 on the aft fuselage, and "FT" for Flight Test on the nose. The prop dome was natural metal and the prop tips are yellow. (National Archives)

# AIR DEVELOPMENT SQUADRON ONE, VX-1


## AIR DEVRON ONE

VX-1 at NAS Key West, Florida, conducted operational tests of the AF-2S and AF-2W in the Hunter-Killer team role from April 1950 through August 1951. The results of these tests pointed out deficiencies in the AN/APS-20A system but rated the team as satisfactory for fulfilling the mission of anti-submarine search, detection and attack. The problem of interference with the AN/APR-9 ECM receiver when the APS-20 was being operated in frequencies near to those of the APR-9 and the problem of the unsatisfactory orientation of the APS-20 radar scanner in the AF-2W were the main discrepancies. One AF-2S and one AF-2W were transferred from NATC to Air Devron One for the tests.


**AF-2W 123089 with the squadron insignia on the forward fuselage below the canopy. Note the location of the wing codes and nose numbers and absence of tail codes. (USN / Tailhook VA-04549)**

# AIR ANTISUBMARINE SQUADRONS VS-931 AND VS-20


**VS-931 AF-2S and AF-2W aircraft on the deck of the USS Sicily (CVE-118) in San Diego on 5-7-52 with a Marine R5C-1 (C-46) and three Marine F7F Tigercats on the afterdeck. The AF's fin tip and main gear were white and the upper half of the engine compartment was black. (National Archives)**

VS-931 was a NAS Willow Grove based reserve squadron that was called to active duty on 1 March 1951. The squadron was transferred to NAS Los Alamitos on 1 May where it operated 20 TBM-3Es and one SNB. The first Guardian, an AF-2S, was received on 30 September. VS-931 was redesignated VS-20 on 4 February 1953, and moved to NAAS Brown Field in November 1954. In October 1954 the squadron began transitioning to the Grumman S2F-1 Tracker. The last AF Guardian left the squadron on 30 December and the squadron was disestablished in June 1956.

VS-931 took its new AFs aboard the USS Bataan (CVL-29) from 5 to 18 January 1952; the USS Rendova (CVE-114) from 9 to 14 March; the USS Bon Homme Richard (CV-31) from 25 to 28 March; and the USS Sicily (CVE-118) from 4 to 25 April to conduct car-quals and ASW training.

The squadron deployed from San Diego on 8 May 1952 aboard the USS Sicily (CVE-118). When the Sicily arrived in Japan, the squadron offloaded to NAS Atsugi where it operated locally. In August through October the squadron operated off the USS Badoeng Strait (CVE-116) during Operation Feint. The squadron boarded the Sicily again and departed Japan on 4 November and arrived in San Diego on 4 December.

The next deployment was aboard the USS Rendova (CVE-114) on 29 December 1953. VS-20 operated with HS-4 Det B (four HO4S-3Ss) conducting ASW exercises until returning to San Diego on 8 June 1954.


LCDR Moorehead's AF-2W 123117 hanging off the bow of the USS Sicily on 4-16-52. (National Archives) VS-931 AF-2S 126777 flies from the Badoeng Strait off Korea in August 1952. (National Archives) VS-20 AF-3S 130365 in 1953; note MAD boom housing on the aft fuselage and the larger radome carried on the AF-3S. (D. Olson)

# AIR ANTISUBMARINE SQUADRON TWENTY - ONE, VS-21

VS-21 traces its origins back to NAS Sand Point, Seattle, where on 26 March 1945, CVEG-41 was established as an ASW force. The CVE air group was comprised of VF-41, flying FM-2 Wildcats, and VT-41, flying TBM-3/3E Avengers. Before the end of the war, the air group moved to Gillespie Field in San Diego and finally to NAS San Diego at North Island, where it is located today. Following redesignation on 15 November 1946 to CVEG-1, VF-1E and VA-1E, the air group began operation from Badoeng Strait developing Hunter-Killer tactics. On 1 September 1948, the air group split with VF-1E preparing for disestablishment on 20 November and VA-1E became VC-21. On 23 April 1950, VC-21 took on its present-day designation of VS-21.

In the squadron's early days, because of a shortage of TBM-3W Guppy aircraft in the Pacific Fleet, VS-21 developed a tactic of teaming a squadron TBM-3S with a Guppy from VC-11 (AEW) Dets to work on Hunter-Killer operations. The first Guardian VS-21 received was an AF-2W in December 1950. By June 1951, the squadron had eight AF-2Ws on board. On 31 June the squadron's eight AF-2Ws were transferred out, possibly to VS-25. Acceptance of the AF started again on 3 December when VS-21 received three AF-2Ws. It was not until May 1952, that the squadron had received their first AF-2S. By September, the squadron had twelve AF-2Ss and nine AF-2Ws. In June 1955, VS-21 started transition training to the S2F-1 Tracker. They received their first S-2F in December and continued to operate the AF until July 1956. VS-21 continued to operate the S-2 until 1975, when it became the first VS squadron to transition to the S-3A.

Initial car-quals were conducted by VS-21 aboard the USS Kearsarge (CV-33) on 30 and 31 July 1952 and on the USS Rendova (CVE-114) on 31 July. These were followed by carrier tests aboard the USS Valley Forge (CV-45) during August to determine the feasibility of utilizing Essex class carriers as CVS platforms. In September the squadron went aboard the USS Philippine Sea (CV-47) twice, and in October aboard the USS Bataan (CVL-29) once.

The squadron left on its first deployment from San Diego on 23 October 1952 in the USS Cape Esperance (CVE-88) for transit to WESTPAC. The squadron was offloaded in Guam where operations were conducted from 15 November 1952 until 8 May 1953. During this time, VS-21 operated seventeen AFs from the USS Bairoko (CVE-115) from 3 February until early April. VS-21 left Guam aboard the USS Bataan on 8 May and arrived at San Diego on 31 May 1953.

The squadron's second deployment was from 27 April until 23 November 1954 in concert with HS-2 Det C (five HO4S-3Ss). This WESTPAC cruise was conducted aboard the USS Point Cruz (CVE-119).

**VS-21 AF-2S 124808 taxiing with a natural metal prop dome and white finette markings. The anti-static discharge wicks can be seen on the control surfaces. (via S. Nicolaou)**


VS-21 AF-2S 126756 runs off the deck of the USS Bairoko (CVE-115) on 12-9-53. The pilot was ENS Warren. The white geometric design on top and bottom of the finettes was for the safety of the deck crews. (National Archives)

VS-21 AF-2S 124868 came to rest atop one of its squadron mates and pushed another off the bow, while landing on the USS Point Cruz (CVE-119) on 8-3-54. The fabric has been burned off the control surfaces. (National Archives)



VS-21 AF-2W 124809 with wings folded. Most AFs had the nose number repeated on the tail just above the hook. (W. J. Balogh Jr. via Menard) VS-21 AF-2W 123111 with red prop dome and natural metal prop hub. The radome was off-white and the nose number (#16) was repeated beneath the wing. A white geometric design was painted on the top and bottom of the finettes. (via Bob Kowalski) VS-21 AF-2W 129265 hit the bridge of the USS Point Cruz (CVE-119) prior to crashing at sea on 3-23-54. CDR Rodney G. Orr and AT-3 Hershall Elliott can be seen exiting the aircraft. (National Archives) VS-21 AF-2S 126806 crashed on 2-16-54. All three crewmen can be seen on the wing. Notice the open escape hatch in both of the crash photos. (National Archives)


# AIR ANTISUBMARINE SQUADRON TWENTY - TWO, VS-22

Similar to VS-21 on the West Coast, VS-22 began as VT-42 at NAS Sanford, Florida, on 19 July 1945 as a component of CVEG-42. CVEG-42 became CVEG-2 on 15 November and began operations from the USS Sicily (CVE-118). CVEG-2 was composed of VF-2E, flying F6F-5Ns and VA-2E, flying TBM-3Es out of NAAS Oceana. On 1 September 1948, CVEG-2 and VA-2E merged into VC-22 (ASW) and on 20 April 1950, VC-22 was redesignated VS-22. VS-22 was based at NAS Norfolk when it received the first AF on 27 June 1951. The squadron operated AFs until June 1954, when they received their first S2F Tracker. VS-22 was disestablished on 18 May 1956. On 18 May 1960, a new VS-22 was established at NAS Quonset Point as part of CVSG-54. The squadron has remained active ever since, transitioning to the S-3A Viking in April 1975.

A tradition of the squadron in the AF days was described by Capt Frank Boushee USN (Ret) was that once a VS-22 pilot was night qualified, he was allowed to wear half Wellington brown boots.

Carrier qualifications in the AF took place from 14 to 18 January and from 5 to 15 February 1952 on board the USS Siboney (CVE-112). These were followed by a series of short exercises on board the USS Mindoro (CVE-120) from 27 February until early August 1952. On 26 August, VS-22 deployed with VC-4 Det 12 (four F6F-5Ns) in Mindoro to the North Sea where the squadron participated in Exercise Mainbrace (first NATO combined ASW operation) and Exercise Emigrant. They returned on 11 October only to leave for an ASW exercise to the Caribbean on 3 November through 17 November.

In 1953 the squadron operated from the USS Salerno Bay (CVE-110) in May; The USS Gilbert Islands (CVE-107) June; and the USS Block Island (CVE-106) in July and August. They deployed to the Mediterranean in October-November while aboard the Block Island along with HS-3 Det 37 (four HO4S-3Ss).

1954 saw the squadron conducting local operations from the USS Sibonet (CVE-112) with HS-1 Det 14 in January and February.

Previous page - VS-22 AF-2W flown by LT Bill Green took a late wave off and started to settle. To avoid a stall, he levelled the wings and poured on the cobs while taking a starboard waveoff. Things got real hairy as he started trolling with his hook, but he made it around and landed high and fast on the next pass. The squadron insignia was painted on the forward fuselage below the cockpit. (via Bob Kowalski)

Above - Overhead view of the USS Mindoro (CVE-120) in 1952 with VS-22 on deck with a HO4S-3S. (USNI via Bob Kowalski)

Below - VS-22 AF-2W catches a wire aboard the USS Block Island (CVE-106) on 23 July 1953. (USN / Tailhook VA-02276)

# AIR ANTISUBMARINE SQUADRON TWENTY - FOUR, VS-24


The forerunner of VS-24, VB-17, was established at NAS Norfolk on 1 January 1943. VB-17 was the first squadron to fly the Curtiss SB2C Helldiver in combat. On 15 November 1946, VB-17 was redesignated VA-5B, and further redesignated on 27 April 1948 as VA-64. On 8 April 1949, VA-64 was redesignated VC-24 at Norfolk, while flying 18 TBM-3Es and again redesignated to VS-24 on 20 April 1950.

VS-24 received its first AF on 27 September of the same year. It was the first East Coast squadron to receive the Guardian and was responsible, along with its West Coast counter-part VS-25, for assisting the Naval Air Test Center in conducting carrier suitability tests. VS-24 conducted these tests aboard the USS Palau (CVE-122). At-sea periods were; 18 to 20 December 1950, 15 to 18 January 1951, and 5 to 7 March, 4 to 18 June 1951. The squadron was transferred to NAS Quonset Point on 15 June 1951 and began transition training for the S2F Tracker in November 1954. The transition was complete and the last Guardian left the squadron in February 1955. The squadron was disestablished on 1 June 1956, only to be reestablished on 25 May 1960. The new VS-24 transitioned to the S-3A Viking in July 1976.

After transferring to Quonset Point, VS-24 operated from the USS Cabot (CVL-28) in the North Atlantic from 8 August to 8 October 1951 and from the USS Saipan (CVL-48) from 21 October to 17 November. From 10 to 14 December a six plane detachment operated from the USS Wright (CVL-49). 1952 started with VS-24 aboard the Cabot from 8 January to 26 March. For the remainder of the

year the squadron operated from the Wright during four at sea periods from 14 to 25 April, 26 to 28 May, 7 to 26 June, and 11 to 25 July. In January 1953, the squadron was aboard the USS Gilbert Islands (CVE-107) where the unofficial "Duty Cat" insignia was put back into use as related by Oscar Schaer (CDR USN Ret.). "We had ten planes up for night quals and the pilots were getting a lot of wave offs. Someone said draw the Duty Cat on the board. We did and all of a sudden the pilots started coming aboard. From that time on the Duty Cat was drawn on the ready room board whenever we were embarked."

April 1953 saw VS-24 aboard the Wright with HS-3 Det 11 (2 HRS-3s).

In January and February 1954 VS-24 operated from the USS Leyte (CVS-32) during its shakedown cruise to Guantanamo Bay, Cuba. VS-24 was accompanied by VC-4 Det 3 (7 F4U-5Ns) and HS-1 Det 3 (4 HO4-3Ss). LCDR Clyde Stallings recalled the cruise. "En route to Gitmo we lost an AF without injury to the crew from a sudden engine failure. A day or two later, I was on the port cat and LTJG C.N. Waterhouse lost his engine on launch from the starboard cat. My launch was cancelled as he was rescued. Flight operations were suspended until fuel samples were taken which were determined to be contaminated. Experts were brought out from Norfolk and it was found that during the ship's last yard period, large amounts of water had frozen in the ship's AvGas storage tanks. Once we reached the Gitmo area the ice thawed and contaminated the fuel. The Leyte shakedown was a painful experience for all concerned, including the aircraft handlers who were trained to handle planes half the weight and size of the AF. Flight deck and hangar deck accidents in repositioning aircraft reached such epidemic

**Previous page: two Hunter-Killer teams from VS-24 on 1-26-51, AF-2W 123103 is in the foreground. The squadron insignia is on the forward fuselage and three out of four AFs have white prop domes. Below, VS-24 AF-2W 123103 and AF-2S 123102 seen from above. (National Archives)**

**VS-24 flightline at Norfolk in January 1951 with eleven AFs in varying degrees of runup prior to the squadron's deployment. Smaller TBMs are parked at the right. (National Archives)**

proportions that CDR Bush, the CO, would not allow a plane to be moved without a pilot in the cockpit. You can guess how the pilots felt about this menial task tacked on to the flight quarters or general quarters evolutions from 0600 to 2400. CDR Bush seriously considered resigning his commission during the deployment."

VS-24 made two more cruises aboard Leyte in March and April 1954. The latter deployment was unique as it consisted of two VS squadrons, VS-24 (eight AF-2Ws, nine -2Ss and three -3Ss); VS-36 (ten AF-2Ws, four -2Ss, and eight -3Ss) and HS-3 Det 51 (twelve HO4S-3s and three HRS-3s). During June VS-24 was in the USS Valley Forge (CVS-45) with VC-4 Det 52 (eight F4U-5Ns) and HS-1 Det 52 (four HO4S-3s).

VS-24's last AF cruise was aboard the USS Antietam (CVS-36) in August 1954 with VC-4 Det 50 (eight F4U-5Ns) and HS-3 Det 50 (three HO4S-3s and three HRS-3s). LCDR Stallings recalled this cruise. "The air boss and the squadron skipper thought it would be neat to deck launch the AF on the canted segment of the deck. LT Frank P. Koval, manned an AF-2W and I manned an AF-2S to make the test. The tail of my AF was over the water and Koval's bird was in front of me. Koval made his takeoff roll, disappeared from my sight for what seemed like a long period of time then reappeared in an extremely nose high attitude, making a wake in the water. I promptly indicated to the deck crew that my plane was sick, because I knew if the -2W did that, my -2S would be in the water because of its greater weight. No further mention was ever made of deck launching on the canted deck."

**VS-24 AF-2S 124192 (2/SI) in January 1951 at Norfolk. (National Archives)**


VS-24 AF-2S catches a wire on the fly. (USN via Joel Griggs) Two views of VS-24 AF-2S 126809 with open crew's hatch and white main gear and finette bottoms. (Dave Menard collection)


# AIR ANTISUBMARINE SQUADRON TWENTY - FIVE, VS-25

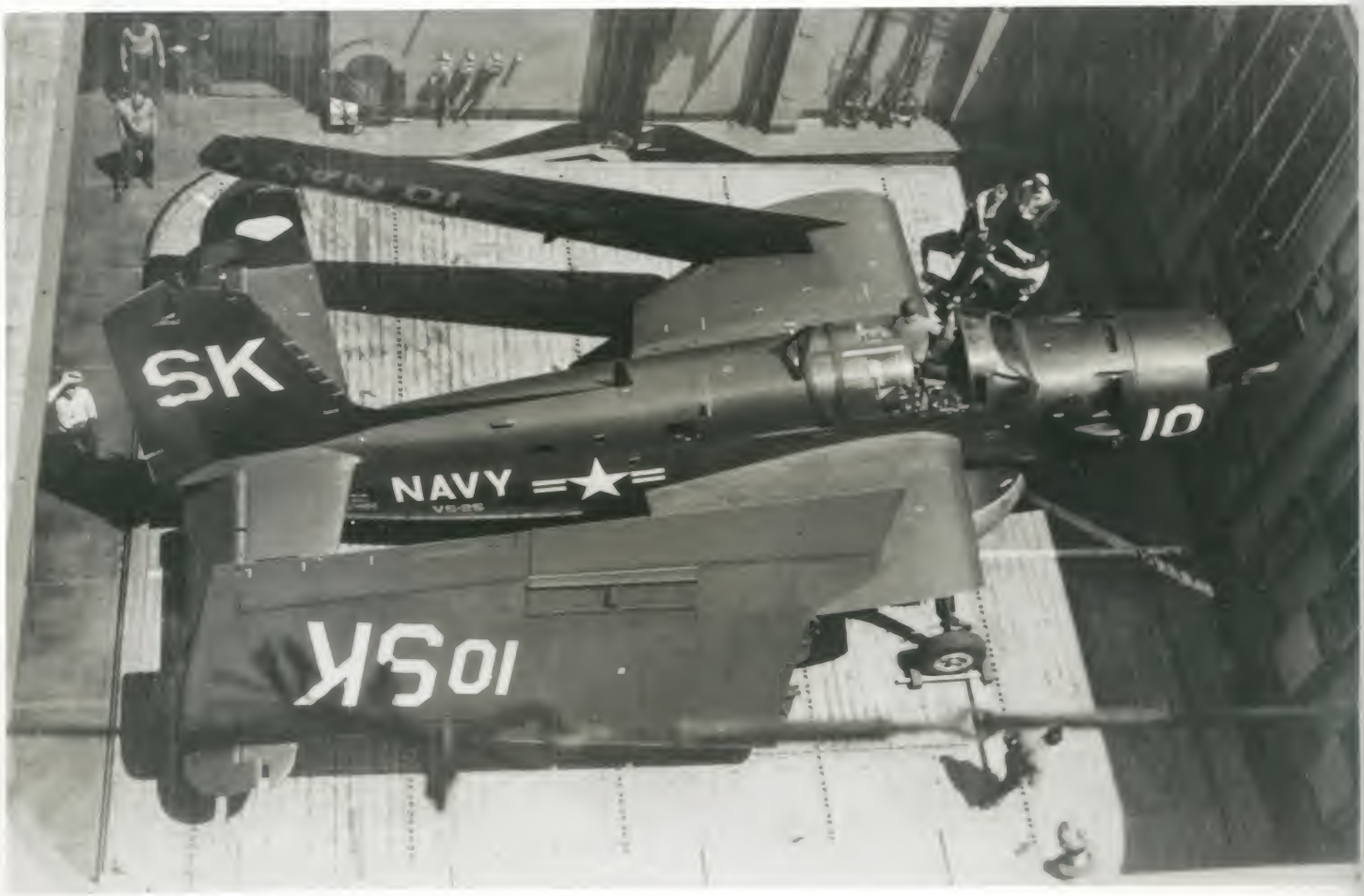
The first VS-25 was established on 15 February 1942 at NAS Willow Grove. The squadron flew antisubmarine patrols in Douglas SBDs. During 1943, VS-25 was redesignated three times. VC-2 on 1 March, VC-25 on 15 September and finally VT-25 on 15 December. As VT-25, they flew the TBM until decommissioning in September 1945.

On 1 April 1949 a new VS-25 was established as VC-25 at NAS San Diego. The squadron then became VS-25 on 20 April 1950. During VS-25's VC period, its tactics were based on the use of a three-plane search team; a lead TBM-3S and two TBM-3Es as attack aircraft. On 17 October 1950, VS-25 became the first West Coast squadron to receive the AF. By March 1951, the squadron became the first completely equipped Guardian squadron, with 18 AFs. VS-25 continued to fly the AF through 31 July 1954, while transitioning to the S2F, starting in June. VS-25 was disestablished on 1 June 1956, with its men and aircraft going to VS-21.

Initial carquals for VS-25 and the AF took place on the USS Essex (CV-9) in June 1951 followed by carquals on the USS Badoeng Strait (CVE-116) from 5 to 24 August. This was followed by an ASW exercise on the Badoeng Strait from 17 to 21 September and an ORI on the USS Bairoko (CVE-115) from 19 to 21 November.VS-25 deployed in Bairoko on 1 December 1951 to West Pac. They operated off Bairoko through 21 January 1952, then off Bataan during February to April. VS-25 returned to Bairoko in May where it remained until returning to San Diego on 10 June 1952. In July 1953, the squadron deployed to WestPac in Sicily (CVE-118). Off loaded at NAS Agana, Guam, in August, it operated locally until returning to Sicily during November and December when it was offloaded at NAF Oppama, Japan. VS-25 returned in Sicily to San Diego on 25 February 1954.

The third VS-25 was established on 1 September 1960, with a new insignia. The squadron was disestablished on 27 September 1968.

**VS-25 AF-2W 124811 positioned on the elevator of a CVE. Crewman in the cockpit has to maintain full rudder deflection in order to clear the deck when the elevator is raised. (USN/ Tailhook)**




VS-25 AF-2S recovers aboard the USS Essex (CV-9) during the squadron's initial carrier qualifications on 6-20-51. The prop dome is natural metal and the finette tips have been painted white for safety's sake. (National Archives)

VS-25 Hunter-Killer team with AF-2W 123117 in the foreground and AF-2S 124188 in the background while flying off San Diego on 10-31-50. Finette tips had not been painted white yet. (R. L. Lawson collection via AAHS)



VS-25 AF-2S 126763 flown by LTJG Ortega launches from the starboard catapult during "Project Steam Flight" operations on the USS Hancock (CVA-19) off the coast of San Diego on 7-22-54. (National Archives)

VS-25 AF-2S lands aboard the Essex on 6-20-51. (National Archives)

N3144G was a former aerial fire fighter stationed at Chico, Calif. After the state outlawed single engine water bombers, the AFs at Chico were retired and this aircraft was restored as a VS-25 AF-2S. Unfortunately the nose number was bogus. Actual VS-25 nose numbers went from 1 to 20. (W. T. Larkins)

# AIR ANTISUBMARINE SQUADRON TWENTY - SEVEN, VS-27

VS-27 was initally established on 15 November 1950 at NAS Norfolk where it made several carrier deployments with the Grumman TBM-3Es. The squadron received their first Guardian on 31 January 1952 and retired their last Guardian on 31 January 1955.VS-27 received its first Grumman S2F Tracker in November 1954, and remained so equipped until disestablished on 30 June 1973.

The squadron deployed to the Caribbean during March through June 1952, while aboard the USS Palau (CVE-122). Local operations in the Norfolk area were conducted off the Palau in August and September and off the USS Salerno Bay (CVE-110) in October.

1953 found VS-27 operating in the Mediterranean off the USS Wright (CVL-49) from 3 February to 12 April. This was followed by a deployment in July through September on the newly redesignated USS Antietam. The Antietam, CV-36, was designated CVS-36 on 8 August. For this deployment VS-27 sent Det 39 only, which was equipped with only one Hunter-Killer team. The remainder of the squadron went aboard the USS Kula Gulf (CVE-108) for a deployment to Guantanamo Bay in August through October. In November, VS-27 embarked again in the Kula Gulf off the coast of North Virginia.

In 1954, VS-27 operated from the Kula Gulf again in February and March; the Antietam in April and in June; the Mindoro (CVE-120) in July and August; and the Leyte (CVS-32) in October.


**VS-27 AF-3S 130367 in 1953 with red prop dome. The wheels, main gear and the lower finette tip were white. The upper crew hatch was open for taxiing. The tip of the MAD boom can be seen behind the tailhook. The aircraft is carrying wing tanks inboard of the main gear and does not have the searchlight mounted on the wing. The object protruding below the lower fuselage just aft of the wing's trailing edge was a periscope. (Stuckey via W. T. Larkins)**

# AIR ANTISUBMARINE SQUADRON EIGHT ZERO ONE / THIRTY, VS-801 / VS-30

VS-30's history can be traced back to VS-801, a reserve squadron based at NAS Miami. The squadron was called to active duty on 8 February 1951 and shortly thereafter reported aboard NAS Norfolk. At the time of the call-up and transfer, VS-801 operated 20 TBM-3Es. The first AF Guardian was received in February 1952. On 1 April 1953 the squadron was redesignated VS-30. The squadron started replacing the Guardians in September 1954 with Grumman S2F Trackers. The last AF left the squadron in December and the S-2 continued on until replaced by the S-3A Viking in August 1967.

Initial carrier qualifications commenced on 3 July and ended on 11 July 1952 on the USS Block Island (CVE-106). Three more at-sea training periods were conducted, two aboard the USS Palau (CVE-122) from 19 to 25 July and from 2 to 5 September and one aboard the USS Kula Gulf (CVE-108) from 29 September to 3 October. This was followed by a month-long deployment to the Caribbean from 24 October to 23 November aboard the USS Wright (CVL-49).

18 February 1953 found the squadron deployed on the Block Island for Operation Springboard in the Caribbean and then on to ASW operations in the North Sea and the Mediterranean. The squadron returned to Norfolk on 3 June and finished out the year with carquals on the USS Mindoro (CVE-120) from 9 to 15 October.

Four sailings aboard Mindoro occurred during 1954. VS-30 along with HS-3 Det 12 (4 HO4S-3Ss) deployed from 27 January to 9 February and then again from 16 February to 16 March to take part in Operation Springboard in the Caribbean. Another ASW exercise was conducted from 6 to 15 April with a final AF deployment to the Mediterranean from 4 May to 9 July in concert with HS-1 Det 51 (4 HO4S-3Ss).

**Two VS-30 AF-2W Guardians on the bow of the USS Mindoro in 1954. (Bob Kowalski)**

**VS-801 AF-2W settles onto the USS Block Island (CVE-106) on 1-7-53. Aircraft has white main gear legs and lower finette stripe and a white prop dome with a red dot on the end. (National Archives)**




## VS-30 AIR OPS ON THE USS MINDORO (CVE-120), 1954.

**AT LEFT, TOP TO BOTTOM: ENS H. R. Dejan in AF-2W #21; LTJG Pete Vrbanek in AF-2S 124834; rockets and depth bombs on deck; AF-3S #5 touches down off center; and AF-2W #17 passes over the deck and sucks up the gear. AT RIGHT, TOP TO BOTTOM: scrapper (AF-2S or 3S) 2/SW being towed forward; guppy 17/SW after landing; two AF-2Ss prepare to launch; and AF-2S 124834 in flight. (Bob Kowalski)**




Three Hunter Killer teams from VS-801 (VS-30) in flight over NAS Norfolk, Virgina, while at 8,000 feet in October 1952. AF-2W 126749 (13/SW) is in the forground flanked by AF-2S 126734 (4/SW). (National Archives)

Following page, VS-31 Hunter-killer team overflys a fleet boat during a training exercise. (USN/Tailhook VA-03049)

# AIR ANTISUBMARINE SQUADRON THIRTY - ONE, VS-31


VS-31 was established as VC-31 on 28 September 1948 at NAS Atlantic City flying the TBM-3E. On 20 April 1950, VC-31 was redesignated VS-31 and homeported at NAS Quonset Point. The squadron received its first AF on 2 April 1951 and operated the Guardian until 31 March 1955 when the squadron finished re-equipping with the Grumman S2F Tracker. The Trackers were were replaced with S-3A Vikings in March 1976.

Initial carrier qualifications were conducted from 20 to 29 June 1951 on the USS Palau (CVE-122). A detachment of 8 AFs and 12 pilots were assigned to the USS Monterey (CVL-26) for low wind landing tests from 9 to 18 August in the Pensacola area. The squadron then took part in LANTFLEX 51 in the Caribbean aboard the USS Wright (CVL-49) from 27 August to 29 October. This was followed by carquals for seven pilots aboard the Wright on 10 December. In 1952 at-sea training was conducted on the Mindoro (CVE-120) from 10 to 25 January. The squadron sent two detachments to sea in February. Det 1 which consisted of nine AFs deployed on the USS Saipan (CVL-48) from 21 February to 26 March to take part in CONVEX III in the Caribbean. Det 2, also with nine AFs, boarded the Wright from 23 February to 21 March for CONVEX III. Five pilots then qualified on the Palau from 1 to 5 April, followed by a Mediterranean deployment in Palau to participate in Operation BEEHIVE II from 16 April to 27 June. This was followed by two more training periods on the USS Block Island (CVE-106) from 7 to 23 August and from 8 to 25 September. On 24 October four AFs were sent to the USS Tarawa to pick up an injured man and return him to Quonset Point.

In 1953 the squadron operated off the USS Gilbert Islands (CVE-107) in April and May, from the USS Siboney (CVE-112) in July and August, followed by a Mediterranean deployment on the Siboney from 15 September to December. On 1 March 1954 VS-31 deployed with VC-4 Det 52 (8 F4U-5Ns) and HS-1 Det 52 (4 HO4S-3s) on the shakedown cruise of the USS Valley Forge (CVS-45). The squadron took part in Operation Springboard and returned port on 21.



April. In July and August VS-31 operated with HS-1 Det 56 (4 HO4S-3s) on the USS Kula Gulf (CVE-108). Then from 23 October to 19 November the squadron returned to the Kula Gulf with HS-3 again. The last carrier launch of a VS-31 AF took place on 18 November when Herb Zoehrer had a cold shot off the starboard cat and landed in the Atlantic Ocean.

**VS-31 AF-2S 124784 in 1951 with white prop dome and squadron insignia on the forward fuselage. (W. J. Balogh Sr. via Menard) VS-31 AF-2W 124795 (via Bob Kowalski) VS-31 AF-2S leaves the USS Wright (CVL-49) with wargame da-glo paint on the wings and fuselage. (USN / Tailhook CV-0381) VS-31 AF-2S 126821 with a red and white prop dome. (via Clay Jansson)**


# AIR ANTISUBMARINE SQUADRON EIGHT THREE ONE / THIRTY - SIX, VS-831 / VS-36

This squadron began as VC-831 at NAS New York in December 1949. In 1950, the reserve squadron was redesignated VS-831 before it was called to active duty on 8 February 1951. VS-831 reported to NAS Norfolk with TBM-3Es for active duty in August. The squadron received its first AF in September 1952 and was redesignated VS-36 on 4 February 1953 as a regular Navy unit. VS-36 operated the AF until September 1954 when it started re-equipping with S2Fs. VS-36 was then disestablished on 31 May 1966.

From January to April 1953, VS-36 operated from the USS Saipan (CVL-48) and the USS Siboney (CVE-112) conducting carrier qualifications and ASW training.The squadron then deployed during June and July on Saipan to South America on a Midshipman Cruise. In October and November, VS-36 operated from the USS Gilbert Islands (CVE-107) with HS-3 Det 40 (4 HRS-3s)

In 1954 VS-36 deployed to the Mediterranean with HS-3 Det 40 (4 HO4S-3s) from 5 January to 12 March. Then in April 1954, the squadron deployed in the USS Leyte with VS-24 and HS-3 Det 51 (12 HO4S-3s and 3 HRS-3s).

**VS-831 AF-2W 129284 in 1952 with a small squadron insignia below the canopy and white finette bottom. (Warren D. Shipp / Tailhook VA-04548) VS-36 Hunter-Killer team with AF-2W 126742 in the foreground flying over the Norfolk area in 1953. (National Archives)**


# AIR ANTISUBMARINE SQUADRON EIGHT SEVEN ONE / THIRTY - SEVEN, VS-871 / VS-37

VS-37 started out as VA-76E at NAS Oakland in 1946 as part of the postwar Organized Reserve. In 1948 the squadron was redesignated VC-871, and in 1949, VS-871. On 1 May 1951, VS-871 was called to active duty and based at NAS Los Alamitos where it flew the TBM-3E until receiving the first AFs on 30 April 1953. On 8 July 1953, VS-871 was redesignated VS-37 and continued to operate the AF until 30 June 1955, when it became the last fleet squadron to turn in its Guardians. The squadron began receiving S2Fs in early 1955 and continued to fly the Stuf until the summer of 1976, when it began transition training in the S-3A Viking. VS-37 was the last fleet squadron to fly the S2F.Since VS-37 was the last AF squadron, its AF-2Ws carried the improved APA-69A ECM antenna on the top of the fuselage. This piece of ECM equipment offered the operator the advantage of a visual bearing indication, or a signature characteristic, combined with a tactical improvement of requiring only two tuning heads to cover the entire spectrum of submarine radar frequencies.

It was during the AF period that the squadron began painting the tails of its aircraft with the distinctive "Rooster Tail" markings, strictly against ComNavAirPac instructions. The Rooster Tail has become a squadron tradition and still proudly adorns VS-37's S-3As today.

VS-37 had four at-sea training periods in 1953; from 15 to 16 June on the USS Bataan (CVL-29), and the USS Rendova (CVE-114) from 18 to 20 August, 8 to 11 September and from 30 September to 2 October.In 1954 VS-37 deployed on the USS Badoeng Strait from April to June. In July, the squadron embarked on the USS Princeton (CVS-37) with VS-23, which had just been equipped with S2F-1s, to participate in the Seattle Sea Fair. The squadron deployed to WestPac on 2 November 1954 in Princeton with VS-23 (16 S2F-1s) and HS-4 Det N (10 HO4S-3Ss). VS-37 was equipped with eight AF-2S and nine -2Ws for this deployment which ended in April 1955.

**VS-37 team in concert with a VS-23 S2F overfly the Princeton on3-8-55. VS-37 AF-2W 130345, markings were white.**

# AIR ANTI SUBMARINE SQUADRON NINE ONE THREE / THIRTY - NINE, VS-913 / VS-39

VS-913, based at NAS Squantum, Mass., was called to active duty 8 February 1951. Transferring to NAS Quonset Point on 1 June, it received its first AF in December. Re-equipping went slowly, not being completed until 11 September 1952. On 4 February 1953, VS-913 became a Regular Navy squadron as VS-39. It operated the AF until 30 June 1955, after receiving its first S2F in April 1955. VS-39 flew S-2s until disestablished on 30 September 1968.

VS-39 deployed on the USS Salerno Bay (CVE-110) in February 1953, the USS Siboney (CVE-112) during April and May, followed by the USS Gilbert Islands (CVE-107) in July to Halifax, with HS-1 Det 40 (three HRS-3s) on a "Middie Cruise". Its next deployment was in the USS Antietam (CVS-36) with VC-4 Det 39 (eight F4U-4Ns) and HS-3 Det 39 (four HO4S-3s) in February 1954. This was followed by Antietam cruises in April with VC-4 Det 59 (seven F4U-4Ns) to participate in Operation Blackjack, which included operations with the Royal Navy off Northern Ireland. The squadron completed the deployment in the Mediterranean. During February to April 1955, VS-39 deployed in Siboney to the Caribbean for its final AF cruise.

During night operations from the Antietam, two VS-39 AFs were lost.These accidents occurred closely together and the probable cause was based on eyewitness accounts. Because the lights on both aircraft went out and there was a sudden loss of radar contact, it was determined that a complete electrical failure caused the accidents. When this happened, the pilot was without any flight instruments except for airspeed, altimeter, needle-ball, vertical speed indicator and magnetic compass. The AF had been designed around a requirement for the flight instruments to be powered by a single electrical source. The solution was to restrict all AFs from night and instrument flight until an older type vacuum-driven, turn and bank indicator was retrofitted. With that installed, the pilot could, after illuminating it with his flashlight, at least be able to keep his wings level and hopefully fly the AF to safety.

**VS-39 AF-2W (1/SN) launches from the USS Siboney (CVE-112) while an AF-2S warms up for its launch. Trailing edge of the vertical and horizontal stabilizers was white.**



Two views of VS-39 AF-2S during landing practice aboard the USS Valley Forge (CVS-45) in September 1954. (Bob Kowalski) VS-39 AF-2S 124785 after a forced landing and fire at East Killingsley, Connecticut, on 12-20-54. (National Archives) VS-39 AF-2S 129218 catches a wire but leaves the deck of the USS Antietam (CVS-36) and is lost at sea off the coast of Guntanamo Bay, Cuba on 2-23-54. Prop domes and finette bottoms were painted yellow on VS-39 aircraft. (National Archives)

# NAVAL AIR RESERVE AIRCRAFT

The Guardian's first appeared in Reserve service with NART (Naval Air Reserve Training) at NAS Oakland on 31 December 1952, and were last seen with NART New York on 30 June 1957. They also served in NARTU units. In total, the AF served with the following Reserve organizations:

**NAS/NART** (tailcode)

| | |
|---|---|
| Akron (L) | 12-31-54 to 03-31-57 |
| Denver (P) | 09-30-55 to 06-30-56 |
| Los Alamitos (L) | 12-31-54 to 12-31-56 |
| Minneapolis (E) | 06-30-55 to 06-30-56 |
| New York (R) | 03-31-53 to 03-31-57 |
| Niagara Falls (H) | 03-31-55 to 06-31-57 |
| Oakland (F) | 12-31-52 to 09-31-56 |
| South Weymouth (Z) | 12-31-54 to 09-31-56 |
| Willow Grove (W) | 12-31-53 to 09-30-56 |

**Naval Air Reserve Training Units (NARTU)**

| | |
|---|---|
| Anacostia (A) | 09-30-54 to 09-30-56 |
| Jacksonville (F) | 12-31-54 to 06-30-57 |
| Lakehurst (N) | 03-31-55 to 03-31-57 |
| Norfolk (S) | 09-30-54 to 03-31-56 |
| Seattle (T) | 12-31-54 to 09-30-56 |

Reserve AFs had a 3 digit modex and an international orange fuselage stripe. Main gear and finettes were blue.



**Akron reserve AF-2S 129221 on display at an air show. International orange fuselage stripe cannot be seen in this photo. (Art Krieger via Clay Jansson) April 1965 AF-2S in Akron markings enroute from Davis Monthon AFB to Montana for conversion to a aerial tanker. (Harry Davidson via I. G. Williamson) AF-2W 129296 in 1956 while assigned to the reserves at Denver. The BuNo has been added to the vertical tail. The international orange fuselage stripe that signifies reserve aircraft is visible in this photo. (Doug Olson via W. T. Larkins)**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Photos at left: NAS Los Alamitos AF-3S 130366 with a white fin cap. (Henry Arnold via AAHS) Los Alimitos-based AF-3S 130365 in rare grey and white color scheme on 5-16-56. Aircraft retained its international orange fuselage stripe. The finettes were white. (Swisher) AF-3S 130382 in 1956 has a red prop dome and yellow prop tips. Bomb-bay is open. (Swisher) Photos at right and below: NAS New York AF-2W 129287 runs up its engine in 1955. (Vincent via W. T. Larkins) AF-3S 129248 prepares to take the runway at NAS New York. (via Bob Kowalski) New York-based AF-3S 129248 and 129246 in flight with rocket rails attached to the wings. #180 has a yellow prop dome.


## NAS NEW ORLEANS

**NAS New Orleans AF-2S with "X" tail code and international orange fuselage stripe. (S. Nicolaou)**

## NAS ANACOSTIA

**NAS Anacostia AF-2W 124783 with "A" tail code at NAF Litchfield Park, Arizona, on 3-21-60. (Swisher)**


## NAS WILLOW GROVE

**NAS Willow Grove AF-2S 124196 with "W" tail code and white wheels. (via Bob Kowalski)**

## NAS JACKSONVILLE

**NAS Jacksonville AF-2S 126756 at Miami in May 1955. Jacksonville and Oakland both used "F" tail codes. (Clay Jansson)**


## NAVAL AIR RESERVE

**NAS Oakland AF-2S 129207 with silver prop dome and a white stripe on the blade antennae. (W. T. Larkins) NAS Oakland AF-2S 129209 in flight on 2-19-53; notice location of wing codes. (via S. Nicolaou)**


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## NAS OAKLAND

Photos at left: NAS Oakland AF-2W 124195 with overall navy blue radome in 1955. (W. T. Larkins) Five NAS Oakland AF-2S aircraft in flight over the bay area. (USN)

## NAS SOUTH WEYMOUTH

NAS South Weymouth AF-2S 129227 on 5-29-55. The guppy in the background had white main gear. NAS South Weymouth AF-2S 124796 on 5-20-56 at the base open house. (T. Cuddy II via Lawrence Webster)


## FIRE BOMBERS

The confusing case of 123100. It is widely accepted that 123100 was N3144G, which was eventually restored and flown in VS-25 markings before being retired to NAS Pensacola (see page 61). However, the photo above leaves doubt in one's mind.



**AF-2s 126759 (not 123100) with N3144G on the fuselage in 1959 at Tulare, California. (Swisher)AF-2S 123088 (N3143G) with finettes at Redding, California,on 6-25-62. (D. Olson via Clay Jansson) Parts ship N9994Z, previously from NAS Akron, in 1978 at Chico, California. N3143G (date unknown) with the engine cowling from N3144G above. (via Menard)**





N3144G in flight. (Aero Union via Lawrence Webster) N3144G with finettes and orange engine cowlings, date unknown. (B. R. Baker via Menard) N9995Z tail code 21E which was flown by the EEA after retiring from Aero Union is now on display at the Pima County Air Museum, in Tucson, Arizona. The fuselage stripe is orange bordered by black and the tail number is black bordered by orange.(Candid Aero Files)


# PLASTIC GUARDIANS

There have been two model kits available for the Grumman AF Guardian aircraft. Both kits were issued in 1/72 scale and were of the vacuform variety.

The first kit issued was produced by Airmodel in the early 1970s. Parts were provided to build the Hunter AF-2W or for the Killer AF-2S model of the Guardian.

The second kit issued was made by Rare Planes in 1990. The kit included parts to build your choice of all three production models of the Guardian: the AF-2S, AF-2W and AF-3S. In addition, parts were included so that the fire bomber version could also be built. In addition to the usual vacuform parts the kit included white metal detail pieces and decals for five different aircraft. The decals allow the modeler to build the following: AF-2S 124826 from VS-931, AF-2W 124847 from VS-931, AF-3S 130366 from NAS Los Alamitos, AF-2S from NAS Oakland, and a AF-2W from VS-25.

The photos illustrate two Rare Plane kits. The top two photos are of AF-2W 124847 in markings of VS-931. The decals used on this model came from the kit. The bottom two photos illustrate a AF-3S from NAS Los Alamitos in the rare grey and white scheme. Decals for this model came from kit bashing.

Because of its huge size the Guardian makes an impressive model, especially when displayed next to a contemporary F8F Bearcat. Overall the kit was not up to the usual high standards found in Rare Plane kits. This may have been because of the joint venture with Esoteric models which brought us this kit. The most notable problem was the fact that the white metal main gear was molded in different lengths. Still, I wish to thank Rare Planes for producing this much needed example of early post war Naval aircraft.

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**BACK COLOR COVER- 1.) TOP LEFT, the original prototype (90504) with "Fertile Myrtle" painted under the cockpit, note the jet exhaust tailpipe. 2.) TOP RIGHT, NATC AF-2W assigned to the Tactical Test division. 3.) UPPER MIDDLE, four factory fresh AF-2W Hunters and four factory fresh AF-2S Killers at Grumman. 4.) MIDDLE, NATC AF-2W Guppy and AF-2S Killer or Scrapper conducting carrier suitability trials while assigned to Flight Test division. 5.) LOWER MIDDLE, two New York reserve AF-2S Killers on the prowl. (all photos via Lawrence Webster) 6.) BOTTOM, AF-2S fire bomber N3144G at Ukiah, California in October 1970. (W. T. Larkins via Lawrence Webster)**

# STANDARD AIRCRAFT CHARACTERISTICS FOR THE AF-2S AND AF-2W

## AF-2S PERFORMANCE SUMMARY

15 FEBRUARY 1952

| TAKE-OFF LOADING CONDITION | | (1) ATTACK 1-Mk. 34 Torp. | (3) ATTACK 1-Mk. 34 Torp. 3-Mk. 54 D.B. 4-3.5" ASW Rock. | (4) ATTACK 1-Mk.41-1 Torp. 6-5" HPAG Rock. | (5) ATTACK 1-Mk.41-1 Torp. 6-5" HPAG Rock. 1-150 Gal.Tank |
|---|---|---|---|---|---|
| TAKE-OFF WEIGHT | lb. | 20,298 | 21,555 | 21,463 | 22,565 |
| Fuel (Fixed/Drop) | lb. | 2,520/- | 2,520/- | 2,520/- | 2,520/900 |
| Payload | lb. | 1,167 | 2,424 | 2,332 | 2,332 |
| Wing loading | lb./sq.ft. | 37.0 | 39.3 | 39.1 | 41.1 |
| Stall speed - power-off | kn. | 76.9 | 79.2 | 79.0 | 81.0 |
| Take-off run at S.L. - calm | ft. | 925 | 1,070 | 1,055 | 1,200 |
| Take-off run at S.L. 17.5kn. wind | ft. | 545 | 640 | 630 | 730 |
| Take-off to clear 50 ft. - calm | ft. | — | — | — | -- |
| Max. speed/altitude (1) | kn./ft. | 231/9,200 | 216/9,200 | 225/9,200 | 221/9,200 |
| Rate of climb at S.L. (1) | fpm | 1,480 | 1,310 | 1,350 | 1,220 |
| Time: S.L. to 10,000 ft. (1) | min. | 7.3 | 8.3 | 7.8 | 8.9 |
| Time: S.L. to 20,000 ft. (1) | min. | 22.0 | 27.8 | 26.1 | 31.8 |
| Service ceiling (100 fpm) (1) | ft. | 22,900 | 21,100 | 21,700 | 20,500 |
| Combat range | n.mi. | 795 | 655 | 710 | 990 |
| Average cruising speed | kn. | 144 | 146 | 147 | 148 |
| Cruising altitude(s) | ft. | 1,500 | 1,500 | 1,500 | 1,500 |
| Combat radius | n.mi. | 320 | 260 | 285 | 395 |
| Average cruising speed | kn. | 144 | 146 | 147 | 148 |

| COMBAT LOADING CONDITION | | (2) COMBAT |
|---|---|---|
| COMBAT WEIGHT | lb. | 18,123 |
| Engine power | | Military |
| Fuel | lb. | 1,512 |
| Combat speed/combat altitude | kn./ft. | 233/1,500 |
| Rate of climb/combat altitude | fpm/ft. | 2,280/1,500 |
| Combat ceiling (500 fpm) | ft. | 21,600 |
| Rate of climb at S.L. | fpm | 2,300 |
| Max. speed at S.L. | kn. | 230 |
| Max. speed/altitude | kn./ft. | 239/4,000 |
| LANDING WEIGHT | lb. | 16,862 |
| Fuel | lb. | 249 |
| Stall speed - power-off | kn. | 70.1 |
| Stall speed - with approach power | kn. | 65.1 |

### WEIGHTS

| Loadings | Lbs. | L.F. |
|---|---|---|
| EMPTY | 14,658 | |
| BASIC | 15,336 | |
| DESIGN | 19,200 | 5.0 |
| COMBAT | 18,123 | 5.0 |
| MAX.T.O. (Field) | 23,015* | 4.2 |
| MAX.LAND.(Field) | 22,500 | |

All weights are actual.

*Maximum anticipated loading.

Spotting:

200 ft. length is required to spot 16 airplanes on the 96 ft. wide deck immediately aft of the forward ramp on the CV-9 class carriers.

## AF-2S ELECTRONICS

VHF COMMAND-------AN/ARC-1
UHF---------AN/ARC-27 OR -27A
(P. S.I., REPL. FOR AN/ARC-1)
MHF LIAISON---------AN/ARC-2
INTERPHONE-AN/AIC-4 OR-4A
HOMING-----------AN/ARR-2A
HOMING-----------AN/ARN-21
(P.S.I., REPL. FOR AN/ARR-2A)
RANGE REC.------R-23A/ARC-5
MARKER BEACON RECEIVER-
AN/ARN-12
RADAR ALT---AN/APN-1 OR-22
SONOBUOY RECEIVER---------
AN/ARR-31 OR -26
RADAR-----AN/APS-31 OR -31A
RADAR RELAY RECEIVER------
AN/ARR-27A
SEARCHLIGHT------AN/AVQ-2A
IFF-----------AN/APX-2 OR -2A
16 SONOBUOYS IN AERO 2A
DISPENSER----------SSQ-2
IFF-----------AN/APX-6
IFF (I-R UNIT)---------AN/APX-17
(P.S.I.REPL.FOR AN/APX-2/2A)

## FUEL AND OIL

| Gals. | No. Tanks | Location |
|---|---|---|
| 270 | 1 | Fuse.,S.S. |
| 150 | 2 | Wing, S.S. |
| 300 | 2 | Wing, Drop |

FUEL GRADE....115/145
FUEL SPEC..MIL-F-5572

**OIL**

CAPACITY (Gals.).....32
GRADE.....1100
SPEC.....MIL-O-6082

## AF-2W PERFORMANCE SUMMARY

| TAKE-OFF LOADING CONDITION | | (1) SEARCH | (3) SEARCH 2-150 Gal.Tank |
|---|---|---|---|
| TAKE-OFF WEIGHT | lb. | 19,637 | 21,802 |
| Fuel (Fixed/Drop) | lb. | 2,520/- | 2,520/1,300 |
| Payload | lb. | -- | -- |
| Wing loading | lb./sq.ft. | 35.8 | 39.8 |
| Stall speed - power-off | kn. | 76.8 | 81 |
| Take-off run at S.L. - calm | ft. | 989 | 1,245 |
| Take-off run at S.L. 17.5kn. wind | ft. | 513 | 688 |
| Take-off to clear 50 ft. - calm | ft. | — | — |
| Max. speed/altitude (1) | kn./ft. | 230/9,200 | 221/9,200 |
| Rate of climb at S.L. (1) | fpm | 1,565 | 1,320 |
| Time: S.L. to 10,000 ft. (1) | min. | 6.9 | 8.3 |
| Time: S.L. to 20,000 ft. (1) | min. | 23.8 | 37.5 |
| Service ceiling (100 fpm) (1) | ft. | 21,200 | 19,600 |
| Combat range | n.mi. | 750 | 1,315 |
| Average cruising speed | kn. | 144 | 145 |
| Cruising altitude(s) | ft. | 1,500 | 1,500 |
| Combat radius | n.mi. | 300 | 525 |
| Average cruising speed | kn. | 144 | 145 |

| COMBAT LOADING CONDITION | | (2) COMBAT |
|---|---|---|
| COMBAT WEIGHT | lb. | 18,629 |
| Engine power | | Military |
| Fuel | lb. | 1,512 |
| Combat speed/combat altitude | kn./ft. | 232/1,500 |
| Rate of climb/combat altitude | fpm/ft. | 2,180/1,500 |
| Combat ceiling (500 fpm) | ft. | 18,900 |
| Rate of climb at S.L. | fpm | 2,200 |
| Max. speed at S.L. | kn. | 228 |
| Max. speed/altitude | kn./ft. | 237/4,000 |
| LANDING WEIGHT | lb. | 17,368 |
| Fuel | lb. | 251 |
| Stall speed - power-off | kn. | 71.9 |
| Stall speed - with approach power | kn. | 67.2 |

### POWER PLANT

NO. & MODEL.....(1) R-2800-48
MFR.....Pratt & Whitney
SUPERCH.....1 Stage, 1 Speed
PROP. GEAR RATIO.....0.45
PROP. MFR.....Ham. Std.
PROP. DES. NO.....6557A-6
NO. BL./DIA.....4/13'-2"

**RATINGS**

| | Bhp @ | Rpm @ | Alt. |
|---|---|---|---|
| T. O. | 2,300 | 2,800 | S. L. |
| MIL. | 2,300 | 2,800 | 3,500' |
| NORMAL | 1,900 | 2,600 | 7,000' |

SPEC. NO. N-8132-C

### WEIGHTS

| Loadings | Lbs. | L.F. |
|---|---|---|
| EMPTY | 15,858 | |
| BASIC | 16,037 | |
| DESIGN | 19,200 | 5.0 |
| COMBAT | 18,629 | 5.0 |
| MAX.T.O. (Field) | 21,802* | 4.4 |
| MAX.LAND.(Field) | 21,500 | |

All weights are actual.

*Maximum anticipated loading.

## AF-2W ELECTRONICS

VHF COMM---------AN/ARC-28
UHF-------- (DUAL) AN/ARC-27
(P.S.I., REPL. FOR AN/ARC-28)
MHF LIAISON---------AN/ARC-2
(ALTERNATE SER. INSTALL.
IN LIEU OF 1 ARC-1 OR
ARC-27)
INTERPHONE AN/AIC-4 OR-4A
HOMING-----------AN/ARR-2A
HOMING-----------AN/ARN-21
(P.S.I., REPL. FORAN/ARR-2A)
RADAR ALT--AN/APN-1 OR -22
RANGE REC-------R-23A/ARC-5
ECM REC. ----------AN/APR-9B
ECM RADAR------AN/APA-70C
RADAR----------AN/APS-20C
SPEED CON KIT---AN/APS-20
RADAR REC SET---AN/APR-12
RADAR RELAY TRANS---------
AN/ART-26 OR -28
GROUND POSITION IND-------
AN/APA-57A OR -57C
GROUND POSITION IND-------
AN/APA-81
IFF-----------AN/APX-2 OR -2A
IFF-----------AN/APX-6
IFF-----------AN/APX-7
(P.S.I., REPL. FOR AN/APX-6)
COM. TILT-STAB. RADAR-IFF
ANT SYS.------AS-539/APS-20


NATC
787
783
780
784
782
779
781
180
NAVY
R
R
187
NAVY
30E
N3144G